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(54) Title: PESTICIDAL AGENTS (57) Abstract <p>A method for killing pests (e.g. insects) comprising administering material from <i>Xenorhabdus</i> species (e.g. <i>X. nematophilus</i>) such as cells or supernatants orally to the pests, either alone or in conjunction with <i>Bacillus thuringiensis</i> or pesticidal materials derived therefrom. Also disclosed is an isolated pesticidal agent (and compositions comprising the same) characterised in that it is obtainable from cultures of <i>X. nematophilus</i> or mutants thereof, has oral pesticidal activity against <i>Pieris brassicae</i>, <i>Pieris rapae</i> and <i>Plutella xylostella</i>, is substantially heat stable to 55 °C, is proteinaceous, acts synergistically with <i>B. thuringiensis</i> cells as an oral pesticide and is substantially resistant to proteolysis by trypsin and proteinase K. DNA encoding pesticidal activity is also disclosed.</p>		

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PESTICIDAL AGENTS

The present invention relates to materials, agents and
5 compositions having pesticidal activity which derive from
bacteria, and more particularly from *Xenorhabdus* species.
The invention further relates to organisms and methods
employing such compounds and compositions.

10 There is an ongoing requirement for materials, agents,
compositions and organisms having pesticidal activity,
for instance for use in crop protection or insect-
mediated disease control. Novel materials are required
to overcome the problem of resistance to existing
15 pesticides. Ideally such materials are cheap to produce,
stable, have a high toxicity (either when used alone or
in combination) and are effective when taken orally by
the pest target. Thus any invention which provided
materials, agents, compositions or organisms in which any
20 of these properties was enhanced would represent a step
forward in the art.

Xenorhabdus spp. in nature are frequently symbiotically
associated with a nematode host, and it is known that
25 this association may be used to control pest activity.
For instance, it is known that certain *Xenorhabdus* spp.
alone are capable of killing an insect host when injected
into the host's hemocoel.

30 In addition, one extracellular insecticidal toxin from
Photorhabdus luminescens has been isolated (this species
was recently removed from the genus *Xenorhabdus*, and is
closely related to the species therein). This toxin is
not effective when ingested, but is highly toxic when
35 injected into certain insect larvae (see *Parasites and
Pathogens of Insects Vol.2*, Eds. Beckage, N. E. et
al., Academic Press 1993).

Also known are certain low-molecular weight heterocyclic compounds from *P.luminescens* and *X.nematophilus* which have antibiotic properties when applied intravenously or topically (see Rhodes, S.H. et al., PCT WO 84/01775).

5

Unfortunately none of these prior art materials have the ideal pesticide characteristics discussed above, and in particular, they do not have toxic activity when administered orally.

10

The present invention provides pesticidal agents and compositions from *Xenorhabdus* species, organisms which produce such compounds and compositions, and methods which employ these agents, compositions and organisms, that alleviate some of the problems with the prior art.

15

According to one aspect of the present invention there is disclosed a method of killing or controlling insect pests comprising administering cells from *Xenorhabdus* species or pesticidal materials derived or obtainable therefrom, orally to the pests.

20

A PCT application of CSIRO published as WO 95/00647 discloses an apparently toxic protein from *Xenorhabdus nematophilus*; however no details of the protein's toxicity are given, and certainly there is no disclosure of its use as an oral insecticide.

25

Thus the invention provides an insecticidal composition adapted for oral administration to an insect, which composition comprises a pesticidal material obtainable from a *Xenorhabdus* species, or a pesticidal fragment thereof, or a pesticidal variant or derivative of either of these.

30

35

The composition may in fact comprise cells of *Xenorhabdus* or alternatively supernatant taken from cultures of cells of *Xenorhabdus* species. However, the composition

preferably comprises toxins isolable from *Xenorhabdus* as illustrated hereinafter. Toxic activity has been associated with material encoded by the nucleotide sequence of Figure 2. Thus, the composition suitably comprises a pesticidal material which is encoded by all or part of the nucleotide sequence of Figure 2. Pesticidal fragments as well as variants or derivatives of such toxins may also be employed.

The sequence of Figure 2 is of the order of 40kb in length. It is believed that this sequence may encode more than one protein, each of which may regulate or be insecticidal either alone or when presented together. It is a matter of routine to determine which parts are necessary or sufficient for insecticidal activity.

As used herein the term "variant" refers to toxins which have modified amino acid sequence but which share similar activity. Certain amino acids may be replaced with different amino acids without altering the nature of the activity in a significant way. The replacement may be by way of "conservative substitution" where an amino acid is replaced with an amino acid of broadly similar properties, or there may be some non-conservative substitutions. In general however, the variants will be at least 60% homologous to the native toxin, suitably at least 70% homologous and more preferably at least 90% homologous.

The term "derivative" relates to toxins which have been modified for example by chemical or biological methods.

These toxins are novel, and they and the nucleic acids which encode them form a further aspect of the invention.

A preferred *Xenorhabdus* species is the bacteria *X.nematophilus*. Particular strains of *X.nematophilus* which are useful in the context of the invention are

ATTC 19061 strain, available from the National Collection of Industrial and Marine Bacteria, Aberdeen, Scotland (NCIMB). In addition, suitable strains include two novel strains of *Xenorhabdus* which were deposited at the NCIMB on 10 July 1997 and were designated with repository numbers NCIMB 40886 and NCIMB 40887. These latter strains form a further aspect of the invention.

All strains have common characteristics as set out in the following Table 1.

Table 1

Characteristics	Strains		
	ATCC 19061	NCIMB 40887	NCIMB 40886
Gram strain	negative	negative	negative
Shape/size	rods up to 4µm long	rods up to 4µm long	rods up to 4µm long
Motile	Yes	Yes	Yes
Bioluminescent	No	No	No
Colour on NBTA*	blue	blue	blue
insecticidal on ingestion by insects	yes	yes	yes
Production of Antibiotics	yes	yes	yes
Resistant to ampicillin (50µg/ml)	yes	yes	yes
colony morphology/ colour	circular convex cream	circular convex cream	circular convex cream

*NBTA (Oxoid nutrient agar containing 0.0025% bromothymol blue and 0.004% tetrazolium chloride)

Preferably the pest target is an insect, and more preferably it is of the order Lepidoptera, particularly

Pieris brassicae, *Pieris rapae*, or *Plutella xylostella* or the order *Diptera*, particularly *Culex quinquefasciatus*.

5 In a preferred embodiment of the invention, cells from *Xenorhabdus* species or agents derived therefrom are used in conjunction with *Bacillus thuringiensis* as an oral pesticide.

10 In further embodiments, rather than using *Bacillus thuringiensis* itself, pesticidal materials obtainable from *B.thuringiensis* (e.g. delta endotoxins or other isolates) are used in conjunction with *Xenorhabdus* species.

15 The term 'obtainable from' is intended to embrace not only materials which have been isolated directly from the bacterium in question, but also those which have been subsequently cloned into and produced by other organisms.

20 Thus the unexpected discovery that bacteria of the genus *Xenorhabdus*(and materials derived therefrom) have pesticidal activity when ingested, and that such bacteria and materials can be used advantageously in conjunction with *B.thuringiensis* (and toxins or materials derived
25 therefrom), forms the basis of a further aspect of the present invention. The pesticidal activity of *B.thuringiensis* isolates alone have been well documented. However, synergistic pesticidal activity between such isolates and bacteria of the *Xenorhabdus* species (or
30 materials derived therefrom) has not previously been demonstrated.

35 In still further embodiments of the invention, culture supernatant taken from cultures of *Xenorhabdus* species, particularly *X. nematophilus*, is used in place of cells from *Xenorhabdus* species in the methods above.

All of these methods can be employed, inter alia, in pest control.

The invention also makes available pesticidal
5 compositions comprising cells from *Xenorhabdus* species, preferably *X.nematophilus*, in combination with *B. thuringiensis*. As with the methods above, a pesticidal toxin from *B.thuringiensis* (preferably a delta endotoxin) may be used as an alternative to *B.thuringiensis* in the
10 compositions of the present invention

Likewise, culture supernatant taken from cultures of *Xenorhabdus* species, preferably, *X.nematophilus* may be used in place of cells from *Xenorhabdus* species.
15

Such compositions can be employed, *inter alia*, for crop protection eg. by spraying crops, or for livestock protection. In addition, compositions of the invention may be used in vector control.
20

The invention further encompasses novel pesticidal agents which can be isolated from *Xenorhabdus* spp. Techniques for isolating such agents would be understood by the skilled person.
25

In particular, such techniques include the separation and identification of toxin proteins either at the protein level or at the DNA level.

30 The applicants have cloned and partially sequenced a region of DNA from *Xenorhabdus* NCIMB 40887 which region codes for insecticidal activity and this is shown as Figure 2 (SEQ ID NO. 1) hereinafter. Thus in a preferred embodiment the invention also provides a toxin which is
35 encoded by DNA of SEQ ID No. 1 or a variant or fragment thereof.

The invention also provides a recombinant DNA which encodes such a toxin. The recombinant DNA of the invention may comprise the sequence of Figure 2 or a variant or fragment thereof. Other DNA sequences may
5 encode similar proteins as a result of the degeneracy of the genetic code. All such sequences are encompassed by the invention.

The sequence provided herein is sufficient to allow
10 probes to be produced which can be used to identify and subsequently to extract DNA of toxin genes. This DNA may then be cloned into vectors and host cells as is understood in the art.

15 DNA which comprises or hybridises with the sequence of Figure 2 under stringent conditions forms a further aspect of the invention.

The expression ``hybridises with'' means that the
20 nucleotide sequence will anneal to all or part of the sequence of Figure 2 under stringent hybridisation conditions, for example those illustrated in ``Molecular Cloning'', A Laboratory Manual'' by Sambrook, Fritsch and Maniatis, Cold Spring Harbor Laboratory Press, Cold Spring
25 Harbor, N.Y.

The length of the sequence used in any particular analytical technique will depend upon the nature of the technique, the degree of complementarity of the sequence,
30 the nature of the sequence and particularly the GC content of the probe or primer and the particular hybridisation conditions employed. Under high stringency, only sequences which are completely complementary will bind but under low stringency
35 conditions, sequences which are 60% homologous to the target sequence, more suitably 80% homologous, will bind. Both high and low stringency conditions are encompassed by the term ``stringent conditions'' used herein.

Suitable fragments of the DNA of Figure 2, i.e. those which encode pesticidal agents may be identified using standard techniques. For example, transposon
5 mutagenesis techniques may be used, for example as described by H.S. Siefert et al., Proc. Natl. Acad. Sci. USA, (1986) 83, 735-739. Vectors such as the cosmid cHRIM1, can be mutated using a variety of transposons and then screened for loss of insectidal activity. In this
10 way regions of DNA encoding proteins responsible for toxic activity can be identified.

For example, the mini-transposon mTn3(HIS3) can be introduced into a toxic *Xenorhabdus* clone such as cHRIM1,
15 hereinafter referred to as 'clone 1', by electroporating cHRIM1 DNA into *E.coli* RDP146(pLB101) and mating this strain with *E.coli* RDP146(pOX38), followed by *E. coli* NS2114Sm. The final strain will contain cHRIM1DNA with a single insertion of the transposon mTn3(HIS3). These
20 colonies can be cultured and tested for insecticidal activity as described in Example 8 hereinafter. Restriction mapping or DNA sequencing can be used to identify the insertion point of mTn3(HIS3) and hence the regions of DNA involved in toxicity. Similar approaches
25 can be used with other transposons such as Tn5 and mTn5.

Site directed mutagenesis of cHRIM1 as outlined in "Molecular Cloning, A Laboratory Manual" by Maniatis, Fritsch and Sambrook, (1982) Cold Spring Harbor, can also
30 be used to test the importance of specific regions of DNA for toxic activity.

Alternatively, subcloning techniques can be used to identify regions of the cloned DNA which code for
35 insecticidal activity. In this method, specific smaller fragments of the DNA are subcloned and the activity determined. To do this, cosmid DNA can be cut with a suitable restriction enzyme and ligated into a compatible

restriction site on a plasmid vector, such as pUC19. The ligation mix can be transformed into *E. coli* and transformed clones selected using a selection marker such as antibiotic resistance, which is coded for on the plasmid vector. Details of these techniques are described for example in Maniatis et al, supra, (see p390-391) and Methods in Molecular Biology, by L.G. Davies, M.D. Dibner and J.F. Battey, Elsevier, (see p222-224).

Individual colonies containing specific cloned fragments can be cultured and tested for activity as described in Example 8 hereinafter. Subclones with insecticidal activity can be further truncated using the same methodology to further identify regions of the DNA coding for activity.

The invention also discloses an isolated pesticidal agent characterised in that the agent is obtainable from cultures of *X. nematophilus* or variants thereof, has oral pesticidal activity against *Pieris brassicae*, *Pieris rapae* and *Plutella xylostella*, is substantially heat stable to 55°C, is proteinaceous, acts synergistically with *B.thuringiensis* cells as an oral pesticide and is substantially resistant to proteolysis by trypsin and proteinase K.

By 'substantially heat stable to 55°C' is meant that the agent retains some pesticidal activity when tested after heating the agent in suspension to 55°C for 10 minutes, and preferably retains at least 50% of the untreated activity.

By 'substantially resistant to proteolysis' is meant that the agent retains some pesticidal activity when exposed to proteases at 30°C for 2 hours and preferably retains at least 50% of the untreated activity.

By 'acts synergistically' is meant that the activity of the combination of components is greater than one might expect from the use of the components individually. For example, when used in conjunction with *B.thuringiensis* cells as an oral pesticide, the concentration of *B.thuringiensis* cellular material necessary to give 50% mortality in a *P.brassicae* when used alone is reduced by at least 80% when it is used in combination the agent at a concentration sufficient to give 25% mortality when the agent is used alone.

It has been found that the activity of the material is retained by 30 kDa cut-off filters but is only partly retained by 100 kDa filters.

Preferably the agent is still further characterised in that the pesticidal activity is lost through treatment at 25°C with sodium dodecyl sulphate (SDS - 0.1% 60 mins) and acetone (50%, 60 mins).

Clearly the characterising properties of the isolated agent described above can be utilised to purify it from, or enrich its concentration in, *Xenorhabdus* species cells and culture medium supernatants. Methods of purifying proteins from heterogeneous mixtures are well known in the art (eg. ammonium sulphate precipitation, proteolysis, ultrafiltration with known molecular weight cut-off filters, ion-exchange chromatography, gel filtration, etc.). The oral pesticidal activity provides a convenient method of assaying the level of agent after each stage, or in each sample of eluent. Such methodology does not require inventive endeavour by those skilled in the art.

The invention further discloses oral pesticidal compositions comprising one or more agents as described above. Such compositions preferably further comprise other pesticidal materials from non-*Xenorhabdus* species.

These other materials may be chosen such as to have complementary properties to the agents described above , or act synergistically with it.

- 5 Preferably the oral pesticidal composition comprises one or more pesticidal agents as described above in combination with *B. thuringiensis* (or with a toxin derived therefrom, preferably endotoxin).
- 10 Recombinant DNA encoding said proteins also forms a further aspect of the invention. The DNA may be incorporated into an expression vector under the influence of suitable control elements such as promoters, enhancers, signal sequences etc. as is understood in the
- 15 art. These expression vectors form a further aspect of the invention. They may be used to transform a host organism so as to ensure that the organism produces the toxin.
- 20 The invention further makes available a host organism comprising a nucleotide sequence coding for a pesticial agent as described above.

- Methods of cloning the sequence for a characterised
- 25 protein into a host organism are well known in the art. For instance the protein may be purified and sequenced: as activity is not required for sequencing, SDS gel electrophoresis followed by blotting of the gel may be used to purify the protein. The protein sequence can be
- 30 used to generate a nucleotide probe which can itself be used to identify suitable genomic fragments from a *Xenorhabdus* gene library. These fragments can then be inserted via a suitable vector into a host organism which can express the protein. The use of such general
- 35 methodology is routine and non-inventive to those skilled in the art. Such techniques may be applied to the production of *X. norhabdus* toxins other than those encoded by the sequence of Figure 2.

It may be desirable to manipulate (eg. mutate) the agent by altering its gene sequence (and hence protein structure) such as to optimise its physical or
5 toxicological properties.

It may also be desirable for the host to be engineered or selected such that it also expresses other proteinaceous pesticidal materials (eg. delta- endotoxin from *B.*
10 *thuringiensis*). Equally it may be desirable to generate host organisms which express fusion proteins composed of the active portion of the agent plus these other toxicity enhancing materials.

15 A host may be selected for the purposes of generating large quantities of pesticidal materials for purification e.g. by using *B.thuringiensis* transformed with the agent-coding gene. Preferably however the host is a plant, which would thereby gain improved pest-resistance.

20 Suitable plant vectors, eg. the Ti plasmid from *Agrobacterium tumefaciens*, are well known in the art. Alternatively the host may be selected such as to be directly pathogenic to pests, eg. an insect baculovirus.

25 The teaching and scope of the present invention embraces all of these host organisms plus the agents, mutated agents or agent-fusion materials which they express.

30 Thus the invention makes available methods, compositions, agents and organisms having industrially applicable pesticidal activity, being particularly suited to improved crop protection or insect-mediated disease control.

35 The methods, compositions and agents of the present invention will now be described, by way of illustration only, through reference to the following non-limiting examples and figures. Other embodiments falling within

the scope of the invention will occur to those skilled in the art in the light of these.

FIGURE

5 Figure 1 shows the variation with time of the growth of *X. nematophilus* ATCC 19061 and activity of cells and supernatants against *P. brassicae* as described in Example 3.

10 Figure 2 shows the sequence of a major part of a cloned toxin gene from *Xenorhabdus*.

Figure 3 shows a comparison of the restriction maps of cloned toxin genes from two strains of *Xenorhabdus*
15 (clone 1 above and clone 3 below).

EXAMPLES

20

Example 1 - Use of *X. nematophilus* cells as an oral insecticide

CELL GROWTH: A subculture of *X. nematophilus* (ATCC 19061,
25 Strain 9965 available from the National Collections of Industrial and Marine Bacteria, Aberdeen, Scotland) was used to inoculate 250 ml Erlenmeyer flasks each containing 50 ml of Luria Broth containing 10g tryptone, 5g yeast extract and 5g NaCl per litre. Cultures were
30 grown in the flasks at 27°C for 40hrs on a rotary shaker.

PRODUCTION OF CELL SUSPENSION: Cultures were centrifuged at 5000 x g for 10 mins. The supernatants were discarded and the cell pellets washed once and resuspended in an
35 equal volume of phosphate buffered saline (8g NaCl, 1.44g Na₂HPO₄ and 0.24g of KH₂PO₄ per litre) at pH 7.4.

ACTIVITY OF CELL SUSPENSION TO INSECTS: The bioassays were as follows: *P. brassicae*: The larvae were allowed to feed on an artificial agar-based diet (as described by David and Gardiner (1965) London Nature, 207, 882-883) into which a series of dilutions of cell suspension had been incorporated. The bioassays were performed using a series of 5 doses with a minimum of 25 larvae per dose. Untreated and heat-treated (55°C for 10 minutes) cells were tested. Mortality was recorded after 2 and 4 days with the temperature maintained at 25°C.

Treatment	LC50 cells/g diet	
	2 days	4 days
Untreated	5.9×10^5	9.8×10^4
15 Treated 55°C	7.1×10^5	1.4×10^5

Aedes aegypti: The larva were exposed to a series of 5 different dilutions of cell suspension in deionised water. The biosassays were performed using 2 doses per dilution of 50 ml cell suspension in 9.5cm plastic cups with 25 second instar larvae per dose. Untreated and heat-treated (55°C or 80°C for 10 minutes) cells were tested. Mortality was recorded after 2 days with the temperature maintained at 25°C.

Treatment	LC50 cells/ml	
	2 days	
Untreated	5.1×10^6	
Treated 55°C	7.4×10^6	
30 Treated 80°C	$> 10^8$	

Culex quinquefasciatus: The larvae were exposed to a single concentration cell suspension containing 4×10^7 cells/ml. The biosassays were performed using 2 50 ml cell suspensions in 9.5 cm plastic cups with 25 second instar larvae per cup. Untreated and heat-treated (55°C or 80°C for 10 minutes) cells were tested. Mortality was

recorded after 2 days with the temperature maintained at 25°C.

	% Mortality
5 Treatment	2 days
Untreated	100
Treated 55°C	100
Treated 80°C	0

10 Thus these results clearly show that cells from *X. nematophilus* are effective as an oral insecticide against a number of insect species (and are particularly potent against *P. brassicae*). The insecticidal activity is not dependent on cell viability (i.e is largely unaffected by
15 heating to 55°C which reduces cell viability by >99.99%) but is much reduced by heating to 80°C, which denatures most proteins.

Example 2 - Use of *X. nematophilus* supernatant as an oral
20 insecticide

CELL GROWTH: Cultures were grown as in Example 1.

25 PRODUCTION OF SUPERNATANT: Cultures were centrifuged twice at 10000g for 10 mins. The cell pellets were discarded.

ACTIVITY OF SUPERNATANT TO INSECTS: The Bioassay was as follows:
30 Activity against neonate *P. brassicae* and two day old *Pieris rapae* and *Plutella xylostella* larvae was measured as for *P. brassicae* in Example 1, but using a series of untreated dilutions of supernatant in place of cell suspensions and with mortality being recorded after 4 days
35 only.

		LC50 (μ l supernatant/g diet)
Insect species		4 days
	<i>P. brassicae</i>	22
5	<i>P. rapae</i>	79
	<i>P. xylostella</i>	135

In addition, size-reducing activity (62% reduction in 7 days) against *Mamestra brassicae* was detected in larvae fed on an artificial diet containing *X. nematophilus* supernatant (results not shown).

Thus these results clearly show that the supernatant from *X. nematophilus* culture medium is effective as an oral insecticide against a number of insect species, and are particularly potent against *P. brassicae*.

The heating of supernatants to 55°C for 10 minutes caused a partial loss of activity while 80°C caused complete loss of activity. Activity was also completely lost by treatment with SDS (0.1% w/v for 60 mins) and Acetone (50% v/v for 60 mins) but was unaffected by Triton X-100 (0.1% 60 mins), non-diet P40 (0.1% 60 mins), NaCl (1 M for 60 mins) or cold storage at 4°C or -20°C for 2 weeks. All of these properties are consistent with a proteinaceous agent.

The general mode of action of *X. nematophilus* cells and supernatants i.e. reduction in larval size and death within 2 days at high dosages, and other properties, eg. temperature resistance, appear to be similar suggesting a single agent or type of agent may be responsible for the oral insecticide activity activities of both cells and supernatants.

35

Example 3 - Timescale for appearance of ingestible insecticidal activity

CELL GROWTH: 1ml of an overnight culture of *X. nematophilus* was used to inoculate an Erlenmeyer flask. Cells were then cultured as in Example 1. Growth was estimated by measuring the optical density at 600 nm.

5

PRODUCTION OF CELL SUSPENSION AND SUPERNATANTS: These were produced as in Examples 1 and 2.

ACTIVITY OF CELLS AND SUPERNATANTS AGAINST *P. BRASSICAE*:

- 10 The cell suspension bioassay was carried out as in Example 1, but using a single dose of suspended cells equivalent to 50 μ l of broth/g diet and measuring mortality after 2 days. The cell supernatant bioassay was carried out as in Example 2, but using a single dose
15 equivalent to 50 μ l supernatant/g diet (i.e. more than twice the LC50) and measuring mortality after 2 days.

- The results are shown in Fig. 1. Thus these results clearly show that cells taken from *X. nematophilus*
20 culture medium are highly effective as an oral insecticide against *P. brassicae* after only 5 hours, and supernatants are highly effective after 20 hours. Although some slight cell lysis was observed in the early stages of growth, no significant cell lysis was observed
25 after this point demonstrating that the supernatant activity may be due to an authentic extracellular agent (as opposed to one released only after cell breakdown).

- Example 4 - Synergy between *X. nematophilus* cells and
30 *B.thuringiensis* powder preparations

- CELL GROWTH AND SUSPENSION: *X. nematophilus* cells were grown and suspended as in Example 1. *B. thuringiensis* strain HD1 (from *Bacillus* Genetic Stock Centre, The Ohio
35 State University, Columbus, Ohio 43210, USA) was cultured, harvested and formulated into a powder as described by Dulmage et al.(1970) J. Invertebrate Pathology 15, 15-20.

ACTIVITY OF *X. NEMATOPHILUS* CELLS AND *B. THURINGIENSIS* POWDER AGAINST *P. BRASSICAE*: The bioassays was carried out using *X. nematophilus* and *B. thuringiensis* in combination or using *B. thuringiensis* cell powder alone. Bioassays were carried out as in Example 1 but with various dilutions of *B. thuringiensis* powder in place of *X. nematophilus*. For the combination experiment, a constant dose of *X. nematophilus* cell suspension sufficient to give 25% mortality was also added to the diet. Mortality was recorded after 2 days.

		LC50 (μ g Bt powder/g diet)
<u>Bioassay</u>		<u>2 days</u>
15	B.t. alone	1.7
	B.t. plus <i>X.nematophilus</i>	0.09

These results clearly demonstrate the synergism between *X. nematophilus* cells and *B. thuringiensis* powder when acting as an oral insecticide against *P. brassicae*.

Example 5 - Synergy between of *X.nematophilus* supernatants and *B. thuringiensis* powder

CELL GROWTH AND PRODUCTION OF SUPERNATANTS: *X. nematophilus* cells were grown and supernatants prepared as in Example 2. *B. thuringiensis* was grown and treated as in Example 4.

ACTIVITY OF *X. NEMATOPHILUS* SUPERNATANTS AND Bt CELL POWDER AGAINST *P. BRASSICAE*: The bioassays were carried out using *X. nematophilus* supernatants and *B. thuringiensis* in combination or using *B. thuringiensis* powder alone. The Bioassay against neonate *P. brassicae* and two day old *Pieris rapae* and *Plutella xylost 11a* larvae w re measured as in Example 2 but with various dilutions of *B. thuringiensis* in place of *X. nematophilus*. For the combination experiment, a

constant dose of *X. nematophilus* supernatant sufficient to give 25% mortality was also added to the diet. Mortality was recorded after 4 days.

5	LC ₅₀ (µg Bt powder/g)		
	diet		
	<u>Insect species</u>	<u>Bt alone</u>	<u>Bt plus Xn</u>
	<i>P. brassicae</i>	1.4	0.12
	<i>P. rapae</i>	2.5	0.26
10	<i>P. xylostella</i>	7.2	0.63

These results clearly demonstrate the synergism between *X. nematophilus* supernatants and *B. thuringiensis* powder when acting as an oral insecticide against several insect species. The fact that both *X. nematophilus* cells and supernatants demonstrate this synergism strongly suggests that a single agent or type of agent is responsible for the demonstrated activities.

20 Example 5 - Characterisation of insecticidal agent from *X. nematophilus* supernatant by proteolysis

CELL GROWTH AND PRODUCTION OF SUPERNATANTS: *X. nematophilus* cells were grown and supernatants prepared as in Example 2.

PROTEOLYSIS OF SUPERNATANT: Culture supernatant (50ml) was dialysed against 0.5 M NaCl (3 x 1 l) for 48 hours at 4°C. The volume of the supernatant in the dialysis tube was reduced five-fold by covering with polyethylene glycol 8000 (Sigma chemicals). Samples were removed and treated with either trypsin (Sigma T8253 = 10,000 units/mg) or proteinase K (Sigma P0390 = 10 units/mg) at a concentration of 0.1 mg protease/ml sample for 2 hours at 30°C.

ACTIVITY OF PROTEASE TREATED SUPERNATANT AGAINST *P. BRASSICAE*: The bioassay against neonate *P. brassicae*

larvae was carried out by spreading 25 μ l of each 'treatment' on the artificial agar-based diet referred to in Example 1 in a 4.5 cm diameter plastic pot. Four pots each containing 10 larvae were used for each treatment.

- 5 Mortalities were recorded after 1 and 2 days. Controls using water only, trypsin (0.1 mg/ml) and proteinase K (0.1 mg/ml) were also tested in the same way.

10 Treatment	% Mortality	
	1 day	2 days
Untreated supernatant	60	100
Proteinase K treated supernatant	45	100
Trypsin treated supernatant	40	100
All controls (no supernatant)	0	0

15

Example 6

Entomocidal activity of other *Xenorhabdus*

- 20 Using the methodology of Examples 1 and 2, four different *xenorhabdus* strains were tested against insect pests.

The results obtained were as follows:

1) Activity to *Pieris brassicae*

Strain deposit no/code	Cells 10^6 /grm diet % mortality	Supernatant LC50 μ l/gram of diet
NCIMB 40887	100	0.09
0014	100	0.52
0015	80	3.73
NCIMB 40886	100	0.05

- 25 It was found that entomocidal activity of cells and supernatant was reduced by more than 99% when all four strains were heated at 80°C for 10 minutes.

II) Activity to mosquitoes (*Aedes aegypti*)

Bacteria added at the rate of 10^7 cells/ml of water

Strain deposit no/code	Cells 10^6 /gram diet % mortality
NCIMB 40887	0
0014	40
0015	45
NCIMB 40886	95

- 5 Furthermore, all strains significantly reduced the growth of *Heliothis virescens*.

Example 7Cloning of toxin genes from strains of *Xenorhabdus*

- 10 Total cellular DNA was isolated from NCIMB 40887 and ATCC 19061 using a Quiagen genomic purification DNA kit. Cells were grown in L borth (10g tryptone, 5g yeast extract and 5g NaCl per l) at 28°C with shaking (150rpm) to an optical density of 1.5 A_{600} . Cultures were
- 15 harvested by centrifugation at 4000xg and resuspended in 3.5mls of buffer B1 (50mM Tris/HCl, 0.05% Tween 20, 0.5% Triton X-100, pH7.0) and incubated for 30 mins at 50°C. DNA was isolated from bacterial lysates using Quiagen 100/G tips as per manufacturers instructions. The
- 20 resulting purified DNA was stored at -20°C in TE buffer (10mM Tris, 1mM EDTA, pH 8.0).

- A representative DNA library was produced using total DNA of NCIMB 40887 and ATTC 19061 partially digested with the
- 25 restriction enzyme *Sau3a*. Approximately 20µg of DNA from each strain was incubated at 37°C with 0.25 units of the enzyme. At time intervals of 10, 20, 30, 45 and 60 minutes, samples were withdrawn and heated at 65°C for 15 minutes. To visualise the size of the DNA fragments, the
- 30 samples were electrophoresed on 0.5% w/v agarose gels.

The DNA samples which contained the highest proportion of 30 to 50kb fragments were combined and treated with 4 units of shrimp alkaline phosphatase (Boehringer) for 15 minutes at 37°C, followed by heat treatment at 65°C to
5 inactivate the phosphatase.

The size selected DNA fragments were ligated into the BamHI site of the cosmid vector SuperCos1 (Stratagene) and packaged into the *Escherichia coli* strain XL Blue 1,
10 using a Gigapack II packaging kit (Stratagene) in accordance with the manufacturers instructions.

To select for cosmid clones with entomocidal activity, individual colonies selected on L agar plates containing
15 25µg/ml ampicillin, were grown in L broth (containing 25µg/ml ampicillin) overnight at 28°C. Broth cultures (50µl) were individually spread onto the surface of insect diet contained in 4.5cm diameter pots, as described in Example 5. To each container 10 neonate *P. brassicae* larvae were added. Larvae were examined after
20 24, 72 and 96 hours recording mortality and size of surviving larvae. A total of 220 clones of NCIMB 40887 were tested, of which two were found to cause reduction in larval growth and death within 72 hours. Of 370
25 clones from ATTC 19061, one was found to cause larval death within 72 hours.

Example 8

Activity of cloned toxin genes to *Pieris brassicae*

30 The three active clones from Example 7 were grown in L broth, containing 25µg/ml ampicillin, for 24 hours at 28°C, on a rotary shaker at 150rpm. The activity of the toxin clones to neonate larvae were performed by incorporation of whole broth cultures into insect diet,
35 as described in Example 1.

<u>Clone No</u>	<u>Strain</u>	<u>LC50 (ul broth/g insect diet)</u>
1	NCIMB 40887	13.03
2	NCIMB 40887	16.7
3	ATTC 19061	108.7
Control*		No effect at 100ul/g

*XL1 Blue *E. coli* broth

When *E. coli* toxin clones were heated at 80°C for 10 minutes and added to the diet at a rate of 100ul/g, no activity to larvae was detected. Highlighting the heat sensitivity of the toxins.

Example 9

Sequencing of the cloned toxin from NCIMB 40887

Cosmid DNA of the entomocidal clone 1 above from NCIMB 40887 was purified using the Wizard Plus SV DNA system (Promega) in accordance with the manufacturers instructions. A partial map of the cloned fragment was obtained using a range of restriction enzymes *Eco*R1, *Bam*H1, *Hind*III, *Sal*I and *Sac*I as shown in Figure 3. DNA sequencing was initiated from pUC18 and pUC19 based sub-clones of the cosmid, using the enzymes *Eco*R1, *Bam*H1, *Hind*III, *Eco*RV and *Pvu*II. Sequence gaps were filled using a primer walking approach on purified cosmid DNA. Sequence reactions were performed using the ABI PRISM™ Dye Terminator Cycle Sequencing Ready Reaction Kit with AmmpliTag DNA polymerase FS according to the manufacturers instructions. The samples were analysed on an ABI automated sequencer according to the manufacturers instructions. The major part of the DNA sequence for the cloned toxin fragment is shown in Figure 2.

Example 10

Restriction map of cloned toxin from clone 3

Cosmid DNA of the entomocidal clone 3 above was purified
5 as described in Example 9. A restriction map of the
cloned fragment was obtained using the restriction
enzymes *Bam*H1, *Hind*III, *Sal*1 and *Sac*1 and this is shown
in Figure 3. When compared with the map from clone 1
(Figure 3) it is clear that over the regions which
10 overlap, the restriction maps are very similar. The
only detectable difference between the two clones was a
reduction in size of two *Hind*III fragments in clone 3,
corresponding to the 11.4kb and 7.2kb *Hind*III fragments
in clone 1 by approximately 2Kb and 200bp respectively.
15 These results indicate the overall relatedness of the DNA
region coding for toxicity in the two bacterial strains.

Example 11

Southern Blot Hybridisation Experiments

20 A 10.3kb *Bam*H1-*Sal*1 fragment of the DNA from clone 1 was
used as a probe to hybridise to total *Hind*III digested DNA
of the *Xenorhabdus* strains ATCC 19061, NCIMB 40886 and
NCIMB 40887. Hybridisation was performed with 20ng/ml of
DIG labelled DNA probe at 65°C for 18 hours. Filters
25 were washed prior to immunological detection twice for 5
minutes with 2 x SSC (0.3M NaCl, 30mM sodium citrate, pH
7.0)/0.1% (w/v) sodium dodecyl sulphate at room
temperature, and twice for 15 minutes with 0.1 x SSC
(15mM NaCl, 1.5 mM sodium citrate, pH 7.0) plus 0.1%
30 sodium dodecyl sulphate at 65°C. The probe was labelled
and experiments performed in accordance with
manufacturers instructions, using a non-radioactive DIG
DNA labelling and detection kit (Boehringer). The probe
hybridised to a *Hind*III fragment of approximately 8kb in
35 all three strains as well as an 11.4kb fragment in NCIMB
40887 and an approximate 9kb fragment in both NCIMB 40886
and ATCC 19061. These results show that strains NCIMB

40886 and ATCC 19061 contain DNA with close homology to the toxin gene of clone 1 above, confirming the similarity between the toxins produced by the three strains.

5

CLAIMS

1. An insecticidal composition adapted for oral
5 administration to an insect comprising a pesticidal material obtainable from a *Xenorhabdus* species, or a pesticidal fragment thereof, or a pesticidal variant or derivative of either of these.
- 10 2. A composition according to claim 1 wherein the said pesticidal material comprises material encoded by the nucleotide sequence of Figure 2 or variant or fragment thereof, or a sequence which hybridises with said sequence.
- 15 3. A composition according to claim 1 or claim 2 which comprises cells of *Xenorhabdus*.
4. A composition as claimed in any one of the
20 preceding claims which comprises supernatant taken from cultures of cells of *Xenorhabdus* species.
5. A composition according to any one of the preceding claims wherein the *Xenorhabdus* species is *Xenorhabdus*
25 *nematophilus*.
6. A composition according to any one of claims 1 to 4 wherein the *Xenorhabdus* species is ATCC 19061, NCIMB 40886 or NCIMB 40887.
30
7. A composition as claimed in any one of the preceding claims which comprises a further pesticidal material not obtainable from *Xenorhabdus*.
- 35 8. A composition according to claim 7 wherein the said further pesticidal material comprises a material obtainable from *B. thuringiensis*.

9. A composition according to claim 8 which further comprises cells of *B. thuringiensis*.
10. A composition according to claim 8 wherein the
5 pesticidal materials obtainable from *B. thuringiensis* comprises the delta endotoxin.
11. A composition according to any one of the preceding
10 claims which further comprises an agriculturally acceptable carrier.
12. A composition according to claim 10 wherein the carrier comprises items of insect diet.
13. A method for killing or controlling insect pests,
15 which method comprises administering to a pest or the environment thereof a composition according to any one of the preceding claims.
14. A method as claimed in claim 12 wherein the pests
20 are insects from the order Lepidoptera or Diptera.
15. A microorganism comprising *Xenorhabdus* strain NCIMB 40886.
- 25 16. A microorganism comprising *Xenorhabdus* strain NCIMB 40887.
17. A pesticidal agent which comprises a a toxin
30 comprising a protein which is encoded by DNA which includes SEQ ID No. 1 or a variant or fragment thereof.
18. An isolated pesticidal agent characterised in that
35 it is obtainable from cultures of *X. nematophilus* or mutants thereof, has oral pesticidal activity against *Pieris brassicae*, *Pieris rapae* and *Plutella xylostella*, is substantially heat stabl to 55°C, is proteinaceous, acts synergistically with *B. thuringiensis* cells as an

oral pesticide, and is substantially resistant to proteolysis by trypsin and proteinase K.

19. An isolated pesticidal agent as claimed in claim 18
5 further characterised in that the pesticidal activity is substantially destroyed by treatment with sodium dodecyl sulphate or acetone or heating to 80°C.

20. An isolated pesticidal agent as claimed in claim 18
10 or claim 19 further characterised in that the agent is an extracellular protein.

21. A recombinant DNA which encodes a pesticidal agent according to any one of claims 17 to 20.
15

22. A recombinant DNA of claim 21 which comprises the sequence of Figure 2 or a variant or fragment thereof.

23. A recombinant DNA which comprises or hybridises
20 under stringent conditions with all or part of the sequence of Figure 2, and which encodes a pesticidal material.

24. An expression vector comprising a recombinant DNA
25 according to any one of claims 21 to 23.

25. A host organism which has been transformed with an expression vector according to claim 24.

30 26. A host organism as claimed in claim 25 which has been engineered or selected such that it also expresses other pesticidal proteinaceous toxicity enhancing materials

35 27. A host organism comprising a nucleotide sequence coding for a fusion protein comprising a pesticidally active portion of an agent as claimed in any one of claims 17 to 20 in combination with other pesticidal proteinaceous toxicity enhancing materials.

28. A host organism as claimed in claim 27 wherein the pesticidal toxicity enhancing materials comprise delta-endotoxin from *B. thuringiensis*.

5

29. A host organism as claimed in any one of claims 25 to 289 wherein the host is a plant.

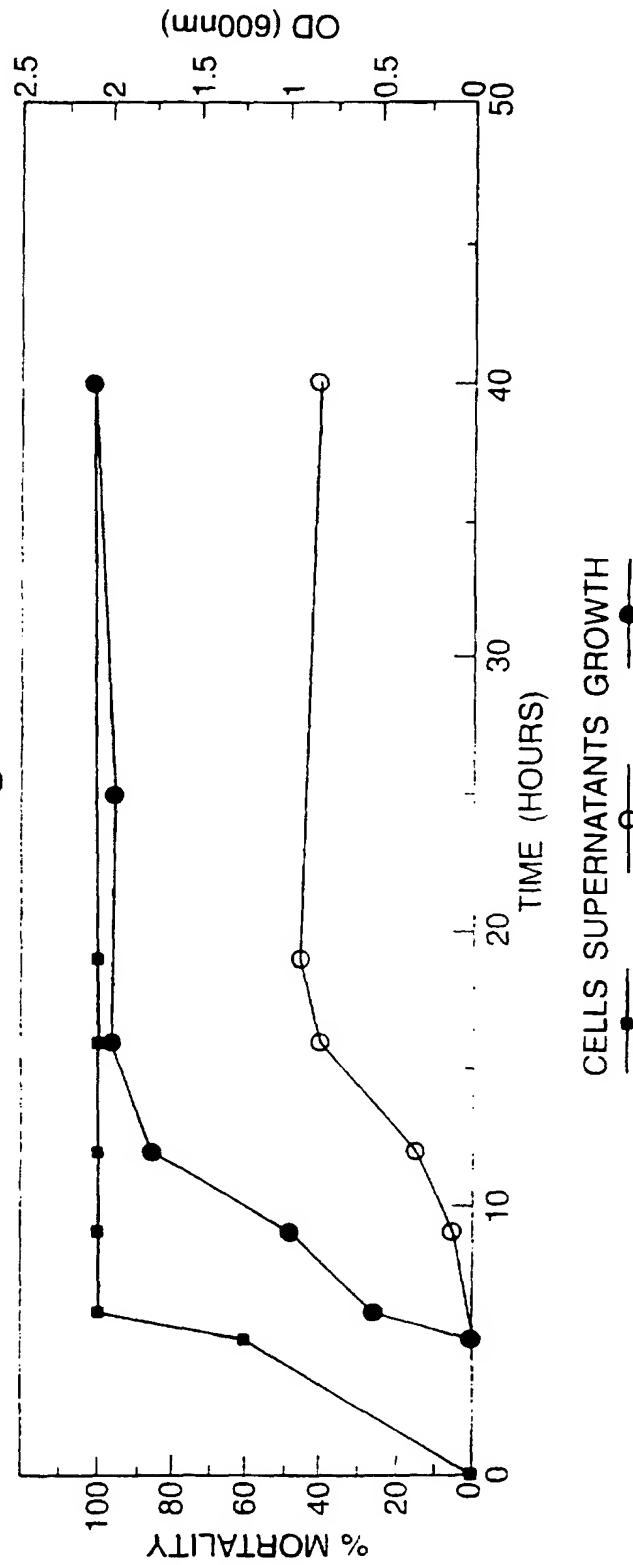
30. A host organism as claimed in any one of claims 25 to 10 28 wherein the host is a virus pathogenic to insects.

31. A fusion protein as expressed by a host as claimed in claim 27.

15 32. An pesticidal composition comprising one or more agents as claimed in any one of claims 17 to 20.

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Fig.1.



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Fig.2.

1	TCCACAATTG	CCGGAGAAAA	TCAGTCGGGA	ACTGCCGGTG	ATTATTCGTC	ACTTATTAAA
61	CGAATTTGCC	GACCAGAATA	AGGCTAAAAA	ACTGCTACAG	GCGCAACGCG	ACTCGAACGA
121	AGCGTTAACG	GTAAAGAGTC	ATTCGGATCC	GCTGTATCGC	TTTTGTGGTT	ATCTGGTGTC
181	TGTCAATGAT	ATGACCGGAA	TGAAGATGGG	CAATAAAAAAC	ATTAGCCCCAC	GAGCACCGAG
241	ATTGTACTTG	TATCATGCCT	ATCTCTCTTT	TATGGAAGCG	CACGGCTTTG	AACGTCCGTT
301	AACACTGACT	AAGTTTGGTG	AATCCATCCC	CAAGATTATG	CTGGAATACC	GGAAGGAGTA
361	TCGAAAAGTG	CGAACCAAGA	AAGGCTATTG	CTATAACGTG	GAATTATCGG	AAGAGGCCGA
421	AGAATGGCTA	CCGTCAGTGC	CTGAGTGTGC	AGACTTTAAA	TCACCTGTAT	AAAACCTTTGA
481	GCTTTAAGTC	TGCACTCCAT	ACACAACCTTA	AAATATCTAA	TTGTATTTAA	AAGAAAATAA
541	TAGATGTATA	GTTATTTTTT	AACTATACAT	AAGCTCTACA	TGCTCTTCAT	TCGTGTAAAA
601	AATGGGTGAA	CAGGTGATAC	AGTCAGTGAA	TATCATATTA	ATTACCGTAA	ACCCAGATGT
661	AGCAAGGCTT	TCAGGGAATT	GTGCAGAGGG	TGCATAACTG	AGAGGGTGAA	AAAGATTTTT
721	AGGGGGGCTT	ATGGCAGGTA	AACAAAATCA	GAAGCAAATA	CCGTGCACAA	TCTGGTTTTT
781	ATTTTTTGGT	ACTACCTCAA	ATTAATAATGA	TGTAATCATC	TGATTTTTATT	TAAGAATAGA
841	AGTTAATCAC	AAATTTCAATG	ATGGACTTTC	ATTACACTG	GTATAGATAA	ATAATTCTGT
901	TATATCCTGT	TTCATTACGC	ATTCATCAGG	AGTGCTGTTA	CAGGAGACAA	GAATGTCACA
961	CATCATTTAC	TTGTCGTTAA	AGGGCAAGAA	GCAGGGTTTA	ATTTACGCGG	GTTGTTCAAC
1021	GCCTGAATCA	ATTGGAAATC	GCTATCAAAA	AGGACGTGAA	GATCAAATAC	AGGTATTGAG
1081	CCTGAATCAT	TCGATGAGCC	GTGACCAGAA	TGTTAATCAT	CAACCCGTCA	GTTTTGTGAA
1141	ACCCATTGAT	AAATCCTCTC	CCCTGTTTGC	TGGATGCCAG	TTTTGTGCAT	TACAGGACAA
1201	GCCAGATGGG	ACAACTGGAG	TTCTTTTATG	AAATCAAGCT	GACCAGTGCC	ACGATTGTGG
1261	ATATTTCTTA	TAATTATCCG	GCATTCAATC	AATGATAATG	GTGCGATACC	CCATGAAGTG
1321	GTGATGCTCG	ATTATAAGTC	CATTTTCATG	AACCAATCG	CCGCAGGACT	TCGGGCTACA
1381	GCATACGCAA	TTAGCCCGAA	GTGAAGAAGC	AAGCCGCTTT	TATCTGGGGT	CTCGAATGTT
1441	AAGCCACTTA	AGAAGCCGCT	GGTTGAAGAA	ACCCCGGTAA	AACCCGCTAA	ACATCATGCC
1501	CGTTATCGTT	GTGTGGATGA	TGACGGCAAT	CTTTTAACCG	AACGCAAGTA	TCGGGTTTTG
1561	CTGCCGGATG	GTCAGATAAA	AGAAGGAAAG	ACTGATAAAC	AAGGTTACAC	CCAATGGCAT
1621	CTTACGGATG	ACAAAAATAA	ACTTGAATTT	CATATTTTAA	AGGATTAATA	CCATGCCAGC
1681	CTATACCGTT	CAGACAAAAA	TAGAATCCAA	CGTACCTGTT	GAAAACTGCT	TTTACGACTT
1741	AACCATTTAT	CGTAAGGATG	CAAAAGGAAA	TTTCCATATC	TTGCTTGATG	TTTTTCAGGA
1801	GAAACTACAG	AGTAATTATG	AAACACAACA	GCATATCAGG	CAGGAAATAG	ACGACGATCT
1861	TTCTGTGATT	TATATTATGC	AAATTATGCT	TCACCCGAAA	CATGGCTCAA	ATATATTTCC
1921	GGCACTGCAA	ACCCATTTTA	AGAAAAATGA	TACCTCGGTT	GAATTAACCT	CCGGTAAAGC
1981	CTGTTCCGGAG	AAAAAACGGG	AAAATGCCTG	TTATTTTGAA	AGTACAGTTG	AAACAAAAACC
2041	TGTCAGCGAC	GGGGATAATA	CCGTTGACTT	AAATATCACT	ATTCTGTAAC	GACCTTTTAT
2101	TGCCAAAGAA	TATCCCATTG	GTCACCCACA	CGATCCATTT	GAAAAAAGTA	AAATTGAATC
2161	ATAAATACAG	GACAGGTTAT	CGAAAAGAAT	TTATCCGGAT	CAAAATGGAG	CAAGTTTATG
2221	TCAGGGCGCG	AGCACACTAT	TTTAGCTGCG	TTTTTAAGAT	GATTATCTCT	TAAATGTTTCA
2281	TTTTAATAGT	GTTTTTATCG	AGTGAAATTT	AATCGCACAG	GCAATTCTTT	AGACTTTTAT
2341	AGAAAACCTAA	AGAATTAAAG	AACAAGATTG	ACATTTTAAAG	TTCAAATATT	AATCAAAGTA
2401	TGCTCGCGCC	CTGAGTTTAT	GTGGCCCTGC	CGCTTTTTTT	TATTGCCTGC	CAATAGATAG
2461	ACCAGATATT	TATGAGCAAG	CGGCACGAGA	ATTATGGCAA	TATGGCCGAA	CTAAAATTGG
2521	TCAACTGGAA	ATTAAGCCGG	GTGAGGGTTG	CCGACATCCT	AAAGGTACTT	TTTATAATCA
2581	ATATGGTGAA	AGAATATCTG	GGTTAGATTG	GCTGACATTG	GCAAGCCTAA	GAGATTTCAGA
2641	AAATATGATG	ATGAGGTTGA	TGATGAAGTA	GCTGGTATTA	CAATGTGGGG	AAAAATTGACA
2701	GAATGGTTTG	AAAAATCAGG	GTATGAAAAA	GTATTTAGTA	ATGTCGGCTT	ATCCCATTTCT
2761	AATATAAATG	ACATAGTAAC	TCTTAGTGAT	TACTATAACA	AAGGATATCA	TGTTGTTACT
2821	TTGATTTTCAG	CAGGAATGTT	ATCAGATTTT	GGTGACATAG	AAACATCAGG	AAAAAATCAT
2881	TGGATAGTTT	GGGAAGGAGT	AGTAGAAAAA	TATGAGAAAG	AAAAATATCA	AAATAATTCA
2941	GATCTGAATC	AATATGTAAA	TTTAAATCTG	TTTTCATGGG	GTAAGATGGA	ACATCAAATT
3001	AAAAAAACA	AATCACTAGA	TTATGTACTC	AACCATATTT	TTTGAGGGTT	GGTTTTTAAA
3061	CCAATGAAAT	AACATGAAAA	AAATATTAAAT	TATTTTTAAT	TTTTTACTTT	ATGGTTGTGG
3121	TAATCCAACG	CCAAAAGTTT	TACCAAAATC	AGAGTTTCTT	CCTGATGCAG	TGATAAATGA
3181	ACCATATCAG	GCATCAATTA	CCATCACAGG	AGGTGCATTG	AATGAAAAAA	CGGTTTGGGT
3241	AAAAATTTCAT	CCTACTGGCT	CAGGACTAAC	ATGGAATCCA	AAAGATAGTT	CTTCTCTATA
3301	GGGTGGAAAA	AAAGAAATAA	GAAAAGATTA	TCATCATATA	AATATAACAG	GTACCCCAAA
3361	GAAGACAGAA	TTGATAAAAA	TTGAAGTGTT	AGGATTTACA	TTGGGTACAA	TGTACGCACG
3421	GAAAGAGTTC	ACTATAAATT	ATACTATAAA	AGTAAGGGAA	TAATTGTCAC	TATCAGAATG
3481	GTGATTTAAT	TCGCCATTTT	TATACTTTTG	TATACTCTCT	CAACATAATC	AGGATTCCTT

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Fig. 2.

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3541	CTTATTATTT	TTCATGGTGC	TAAAAACGTT	TATTGCAAAA	ATAAATTAAG	TTAATCAGAT
3601	AAATTATCTG	CATTACTGTT	ATAATCGATA	ACACGATAAC	CTGACTTTCT	GCCTGTTCTT
3661	ATGAACCTCG	AGATAATCCT	TTCTGAGCCT	GAACGAATCA	CATTGCAACC	ACTCGCTTTG
3721	AATCACCCAC	ACCGGGACAT	TCGTACGCGA	GGAACGGGTT	TACTCATGCT	TGCCAGAGGG
3781	AGCAAGCCGT	CCCAGATCAC	CGCTGAAATC	GGATGCAGTC	TCCGGGTTAT	CTGTAATTGG
3841	GTTTACATGT	GGCACAGATA	GCGGGATTAT	TCGGCGGTCA	TGCCGGAGGC	CGGTATCTCG
3901	CCATGACGCC	TGACATGATT	GCCACTGCGC	TCGAAGCCGC	CAGCGCAGAG	TCCCTGACGT
3961	GCGTCGAAGC	CAGGCAGGGT	TTCCCTGCCT	TGTACGCTTG	AAACGCTGGC	GAATACCCGT
4021	AAAAAACAGG	GGCTCCCCTA	TAAACGCCCC	CGCCTGTCCG	TTAAAAAAG	CGCAATAAAA
4081	CGGAGTTTGC	TGAAAAATCC	GCCTTGCTGA	ATAAAATTAA	GGCCGGAGCA	CAGTCAGGAC
4141	ATTACCGTCT	GGTCTATTTT	GAGTTCTGGG	GGCGTTAAAT	TACACGGATA	ACACGCTGTT
4201	TTACCAGACA	ACGTCAGGCA	GTATCACGCG	AGATGACGTG	ATTGATTTTT	TAGAGCCGGT
4261	GGCCAGACAA	GGGACAACCG	CCTGACATTT	TTAGTGTGG	ATAATCGCG	TATCCATCAC
4321	GGGATAGAGG	AAAAAATCAG	AAATGGCGGG	TGACGAGAAC	ACAACCTGTT	TTTATTCTAT
4381	CTTCCCGCTT	ACAGCCCAGA	GCTGTATCTG	ATTGAAATCG	TCTGGAAACA	GGCCAAATAC
4441	GACTGGCGAC	GTTTTATCAC	CTGGACTCAG	GATACAATGG	AATATGAGGT	AAATACTTTA
4501	TTGAAAGGTT	ATGGCGACCA	ATTTGCAATT	AACTTTTCTT	GAGTACTTAG	TAAGAATAGA
4561	GTCAGTCGAG	GTTTTTTTCT	TTCCGGTTCG	GGGGATGATA	CTGAAAATTG	GTTTGTAAATC
4621	TCTGAAAAAT	GCTGTTTCTG	TGGCTACGTC	TGTCTTTTGG	GATATTGTTT	CCATCAAGTC
4681	TGTCAACATA	CTGTTAAGTT	AGATGTTGAT	AAAAGAGACT	GAATTATAAT	ACAAAAACAAT
4741	AAATCAGTTG	GACAATATTT	TATTTTACAT	GAGACATTAA	GGTTGATTTT	CCCAATCTGG
4801	TCAGTTATAA	CCGAATAAGG	ATCTTGAAAA	ATCATGGGAT	CTTACTTTTA	TCAAATGAAG
4861	TTAACGTAAA	AGTTGATAAA	GAAAAATTAT	TAATTCTAAG	TGCGGTTGCA	ATAAATATTT
4921	TGTGTTTTGT	TAATGAATGA	ATAACCAGGT	AAGCTGGATT	TTTATTTTTT	AAATTAATCT
4981	TACAATATGC	TATTTATTTA	TATAAAGAGT	TTGTGCCCAT	TTAACCAAGT	AACAAATTTG
5041	TTCAACCGTA	ACTTAGCTTC	ATCGACTTTT	GGCCTCGCCT	GGTCAGAATC	TAGGGCCGTT
5101	ATCCTATTTA	TTTATGATAA	ATAAAATTTA	ATTATCTTTA	ATAAGCTGAA	TATGTGGATT
5161	TGTGCTCAAT	CTTGGATTCA	AGTATGTATT	CCTTTTGGTA	CCCTGCTTTA	TTTTAAGGCA
5221	GATGAAGAGG	ATGCCAACAT	GACACAATAT	GACATTACGAC	TGTAACATTA	TGTCAGTTA
5281	TAAATTTTTAT	GATTAAAAATG	AAATTTTAGT	AGAAAAATCGT	ATTCTATTCC	GCCATTTACA
5341	ATAGCATCCT	CTTTAATATC	ATTAATCTCA	GATAAAACAA	ATAATTACAA	TGTGAATAGA
5401	ATAATGACTT	ACAAAAATAAG	CACTAAATCT	TCAGATGAAC	TCTTAACATA	CAACACTATT
5461	TTATAAAATA	ATTGAGGTTA	TTATGTTATG	CACGGCTGTA	TTACTCACTA	AAATCAAGTC
5521	CACCTCGGAC	GGTCAGACGA	TGACTCTTGC	GGATCTGCAA	TATTTATCCT	TCAGTGAAGT
5581	GAGAAAAATC	TTTGATGACC	AGCTCAGTTG	GGGAGAGGCT	CGCCATCTCT	ATCATGAAAC
5641	TATAGAGCAG	AAAAAAAATA	ATCGCTTGCT	GGAAAGCGCT	ATTTTTACCC	GTGCCAACCC
5701	ACAATTATCC	GGTGCTATCC	GACTCGGTAT	TGAACGAGAC	AGCGTTTTCAC	GCAGTTATGA
5761	TGAAATGTTT	GGTGCCCGTT	CTTCTTCCCT	TGTGAAACCG	GGTTTCAGTG	CTTCCATGTT
5821	TTACCCGGCT	GGCTATCTCA	CCGAATTTGA	TCGTGAAGCG	AAGGACTTAC	ATTTTTCAAG
5881	CTCTGCTTAT	CATCTTGATA	ATCGCCGTCC	GGATCTGGCT	GATCTGACTC	TGAGCCAGAG
5941	TAATATGGAT	ACAGAAATTT	CCACCCTGAC	ACTGTCTAAC	GAAGTGTGTC	TGGAGCTATT
6001	ACCCGCAAGA	CCGGAGGTGA	TTCCGAGCGCA	TTGATGGAGA	GCCTGTCAAC	TTACCGTCAG
6061	GCCATTGATA	CCCCITACCA	TCAGCCTTAC	GAGACTATCC	GTCAGGTCAT	TATGACCCAT
6121	GACAGTACAC	TGTCAGCGCT	TGCCCGTAAT	CCTGAGGTGA	TGGGGCAGGC	GGAAAGGGCT
6181	TCATTACTGG	CGATTCTGGC	CAATATTTCT	CCAGAACTGT	ATAACATTTT	GACCGAAGAG
6241	ATTACGGAAA	AGAACGCTGA	TGCTTTATTT	GCGCAAAACT	TCAGTGAATA	TATCAGCCCC
6301	GAAAAATTCG	CGTCACAATC	ATGGATAGCC	AAGTATTATG	GTCTTGAATC	TTCTGAGGTG
6361	CAAAAATACC	TCGGGATGTT	GCAGAATGGC	TATTTCTGACA	GCACCTCTGC	TTATGTGGAT
6421	AATATCTCAA	CGGGTTTAGT	GGTCAATAAT	GAAAGTAAAC	TCGAAGCTTA	CAAAATAACA
6481	CGTGTAAAAA	CAGATGATTA	TGATAAACAT	GTAAATTACT	TTGATCTGAT	GTATGAAGGA
6541	AATAATCAAT	TCTTTATATG	TGCTAAATTT	AAGATATCGA	GAGAATTTGG	GGCGACTCTT
6601	AGGAAAAACT	CAGGGACAAG	TGGCATTGTC	GGCAGCCTTT	CCGGTCCCCT	GGTAGCCAAT
6661	ACTAATTTCA	AAAGCAATTA	CTTAAGTAAC	ATATCTGATA	ATGAATACAG	AAATGGCGTA
6721	AAAAATATATG	CCTATCGCTA	TACGTCTTCC	ACCAGCGCCA	CAAATCAGGG	CGGCGGAATA
6781	TTCACTTTTG	AGTCTTATCC	CCTGACTATA	TTTGCGCTCA	AAGTGAATAA	AGCCATTCCG
6841	TTGTGCCTGA	CTAGCGGGCT	TTACCCGAAT	GAACTGCAAA	CTATCGTACG	CAGTGACAAT
6901	GCACAAGGCA	TCATCAACGA	CTCCGTTCTG	ACCAAAGTTT	TCTATACTCT	GTTCTACAGT
6961	CACCGTTATG	CACTGAGCTT	TGATGATGCA	CAGGTACTGA	ACGGATCGGT	CATTAATCAA
7021	TATGCCCGAC	GATGACAGTG	TCAGTCAATT	TAACCGTCTC	TTTAATACCC	CGCCGCTGAA
7081	AGGGAAAAATC	TTTGAAGCCG	ACGGCAACAC	GGTCAGCATT	GATCCGGATG	AAGAACAATC
7141	TACCTTTGCC	CGTTCAGCCC	TGATGCGTGG	TCTGGGGATC	AACAGTGGTG	AACTGTATCA
7201	GTTAGGCAAA	CTGGCGGGTG	TATTGGACAC	ACAAAAATATC	CTCACACTTT	CTGTCCCTGT
7261	TATATCTTCA	CTGTATCGCC	TCACGTTACT	GGCCCGTGCC	CATCAGCTGA	CGGTTAATGA
7321	ACTGTGTATG	CTTTATGGTT	TTTCGCCGTT	CAATGGCAAA	ACAACGGCTT	CTTTGTCTTC

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Fig.2.

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7381	CGGGGAGTTG	TCACGGCTGG	TTATCTGGTT	GTATCAGGTG	ACGCAGTGGC	TGACTGAGGG
7441	CGGAAATCAC	CACTGAAGCG	ATCTGGTTAT	TATGTACGCC	AGAGTTCAGC	GGGAATATTT
7501	CACCGGAAAT	CAGTAATCTG	CTTAATACTC	TCCGACCCCG	TATTAGTGAA	GACATGGCAC
7561	AAAGTAGTGA	CCGGGAGCTT	CAGGCTGAAA	TTCTCGCGCC	GTTTATTGCT	GCAACGCTGC
7621	ATCTGGCGTC	ACCAGATATG	GCGCGGTATA	TCCTGTTGTG	GACTGATAAC	CTGCGGCCGG
7681	GCGGCCTGAA	TATCGCCGGA	TTTATGATGC	TGGTGCTGAA	AGAGACGCTG	AGTGATGAGG
7741	AAACGACCCA	ACTGGTTCAA	TTCTGCCATG	TAATGGCACA	GTTATCGCTT	TCCGTGCAGA
7801	CACTGCGTCT	CAGTGAAGCA	GAGCTTTCTG	TGCTGGTCAT	TTCCGATTTT	GTGGTACTGG
7861	GTGCGAGAAG	CCAACCGCCG	GACAACACAA	TATTGATACT	CTGTTCTCAC	TCTACCGATT
7921	CCACCACTGG	ATTAATGGGC	TGGGAAATCC	CGGCTCTGAC	ACGCTGGATA	TGCTGCGCCA
7981	AGCAGACACT	CACGGGCGAC	AGACTGGGCC	TCCGTGATGG	GGCTGGACAT	CAGTATGGTA
8041	ACGCAGGCCA	TGGGTTCCCG	CCGGCGTGAA	CCAACCTTCAG	TGTTGGCAGG	ATATCAACCC
8101	CGTGTTGCAG	TGGATACATG	TGGCATCAGC	ACTGCTCACT	GATGCCGTG	GTTATCCGTA
8161	CGCTGGTGAA	TATCCGTTAC	GTGACTGCAT	TAAACAAAGC	CGAGTCGAAT	CTGCCTGCCT
8221	GGGATAAGTG	GCAGACGCTG	GCAGAAAATA	TGGCAGCCGG	ACTGAGTACA	CAACAGGCTC
8281	AGACGCTGGC	GGATTATACC	GCAGAGCGCC	TGAGTAACGT	GTTGTGCAAT	TGGTTTCTGG
8341	CGAATATCCA	GCCAGAAGGG	GTGTCCCTGC	ACAGCCGGGA	TGACCTGTAC	AGCTATTTCC
8401	TGATTGATAA	TCAGGTCTCT	TCTGCCATAA	AAACCAACCCG	ACTGGCAGAG	GCCATTGCCG
8461	GTATTACAGT	CTACATCAAC	CGGGCGCTGA	ACCGGATAGA	GCCTAATGCC	CGTGCCGATG
8521	TGTCAACCCG	CCAGTTTTTT	ACCGACTGGA	CGGTGAATAA	CCGTTACAGC	ACCTGGGGCG
8581	GGGTGTCGCG	GCTGGTTTTAT	TATCCGGAAA	ATTACATTGA	CCCGACCCAG	CGTATCGGGC
8641	AGACCCGGAT	GATGGATGAA	CTGCTGGAAG	ATATCAGCCA	GAGTCAGCTC	AGCCGGGACA
8701	CGSTGGAAGA	GGCCTTTAAA	ACTTACCTGA	CCGCTTTGAA	ACCGTGGCAG	ACCTGAAAGT
8761	TGTCAGCGCT	ATCACCGACA	ACGTCAACAG	CAACACCGGA	CTGACCTGGT	TTGTGCGCCA
8821	AACGCGGGAG	AACCTGCCGG	AATATTACTG	GCGTAACGTG	CATATATCAC	GGATGCAGGC
8881	GGGTGAACCTG	GCCGCCGATG	CCTGGAAGA	TTGGACGAAG	ATTGATACAG	CGGTCAACCC
8941	ATACAAGGAT	GCAATACGTC	CGGTCATATT	CAGGGAACGT	TTGCACCTTA	TCGTGGGTAG
9001	AAAAAGAGGA	AGTGGCGAAA	AATGGTACTG	ATCCGGTGGA	AACCTATGAC	CGTTTTACTC
9061	TGAAACTGGC	GTTTCTGCGT	CATGATGGCA	GTTGGAGTGC	CCCCTGGTCT	TACGATATCA
9121	CAACGCAGGT	GGAGGCGGTC	ACTGACAAAA	AACCTGACAC	TGAACGGCTG	GCGCTGGCCG
9181	CATCAGGCTT	TCAGGGCGAG	GATACTCTGC	TGGTGTTTGT	GTACAAAACC	GGGGTGAGTT
9241	ACCCGGATTT	TGGCGACAAC	AATAAAAATG	TGGCAGGCAT	GACCATTTAC	GGCGATGGCT
9301	CCTTCAAAAA	GATGGAGAAC	ACAGCACTCA	GCGTTACAGC	CAACTGAAAA	ATACCTTTGA
9361	TATCATTTCAT	ACTCAAGGCA	ACGACTTGGT	AAGAAAAGGCC	AGCTATCGTT	TCGCGCAGGA
9421	TTTTGAAGTG	CCTGCCTCGT	TGAATATGGG	TTCTGCCATC	GGTGATGATA	GTCTGACGGT
9481	GATGGAAAAC	GGGAATATTC	CGCAGATAAC	CAGTAAATAC	TCCAGCGATA	ACCTTGCTAT
9541	TACGCTACAT	AACGCCGCTT	TCCTGTCTAG	ATATGATGGC	AGTGGCAATG	TCATCAGAAA
9601	CAACCAAAATC	AGCGCCATGA	AACGTACGGG	GTTGGATGAA	AGTCCCACTA	CGGCAATGCA
9661	TTTATCATCG	CAAATACCGT	TAAACATTAT	GGCGGTTACT	CTGATCTGGG	GGGCCGATC
9721	ACCGTTTTTA	TTAAAACGGA	AAAACATAT	TGCATCAGTT	CAAGGCCACT	TGATGAACGC
9781	AGATTACACT	AGGCGTTTGA	TTCTAACACC	AGTTGAAAAT	AATTATTATG	CCAGATTGTT
9841	CGAGTTTCCA	TTTTCTCCAA	ACACAATTTT	AAACACCGTT	TTACCGTTTG	GTAGCAATAA
9901	AACCACTGAT	TTTAAAAAGT	GCAGTTATGC	TGTTGATGGT	AATAATTCTC	AGGGCTTCCA
9961	GATATTTAGT	TCCTATCAAT	CATCCGGCTG	TCTGGATATT	GACACAGGTA	TTAACAATAC
10021	TGATGTCAAA	ATTACGGTGG	TAGCTGGCAG	TAAAACCCAC	ACCTTTACGG	CCAAGTACCA
10081	TATTGCTTCC	TTGCCGGCAA	ACAGTTTTGA	TGCTATGCCG	TACACCTTTA	AGCCACTGGA
10141	AATCGATGCT	TCATCGTTGG	CCTTTACCAA	TAATATTGCT	CCTCTGGATA	TCGTTTTTGA
10201	GACCAAAGCC	AAAGACGGGC	GAGTGCTGGG	TAAGATCAAG	CAAACATTAT	CGGTGAAACG
10261	GGTAAATTAT	AATCCGGAAG	ATATTCTGTT	TCTGCGTGAA	ACTCATTCGG	GTGCCCCATA
10321	TATGCAGCTC	GGGGTGATATC	GTATTCTGCT	TAATACCCTG	CTGGCTTCTC	AACTGGTATC
10381	CAGAGCAAAC	ACGGGCATTG	ATACTATCCT	GACAATGGAA	ACCCAGCGGT	TACCGGAACC
10441	TCCGTTGGGA	GAAGGCTTCT	TTGCCAACTT	TGTTCTGCCT	AAATATGACC	CTGCTGAACA
10501	TGGCGATGAG	CGGTGGTTTA	AAATCCATAT	CGGGAATGTT	GGCGGTAAAC	CGGGAAGGCA
10561	GCCTTATTAC	AGCGGAATGT	TATCCGATAC	GTCCGAAACC	AGTATGACAC	TGTTTGTCCC
10621	TTATGCCGAA	GGGTATTACA	TGCATGAAGG	TGTCAGATTG	GGGGTTGGAT	ACCAGAAAAAT
10681	TACCTATGAC	AACACTTGGG	AATCTGCTTT	CTTTTATTTT	GATGAGACAA	AACAGCAATT
10741	TGTATTAATT	AACGATGCTG	ATCATGATTC	AGGAATGACG	CAACAGGGGA	TCGTGAAAAA
10801	TATCAAGAAA	TACAAAGGAT	TTTTGAATGT	TTCTATCGCA	ACGGGCTATT	CCGCCCCGAT
10861	GGATTTCAT	AGTGCCAGCG	CCCTCTATTA	CTGGGAATGT	TCTATTACAC	CCCGATGATG
10921	TGCTTCCAGC	GTTTGCTACA	GGAAAAACAA	TTCCGACGAAG	CCACACAATG	GATAAACTAC
10981	GTCTATAATC	CCGCCGGCTA	TATCGTTAAC	GGAGAAATCG	CCCCCTGGAT	CTGGAACCTGC
11041	CGGCCGCTGG	AAGAGACACT	CCTGGAATGC	CAATCCGTTG	GATGCCATTG	ATCCGGATGC
11101	CGTCCGACAA	TATGACCCGA	CACACTATAA	AGTTGCCACC	TTTATGCGCC	TGTTGGATCA
11161	ACTTATTCTG	CGCGGCGATA	TGGCCTATCG	CGAACTGACC	CGCGATGCGT	TGAATGAAGC

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Fig.2.

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11221	CAAGATGTGG	TATGTGCGTG	CTTTGGAATT	GCTGGGTGAT	GAGCCGGAGG	ATTACGGCAG
11281	CCAACAGTGG	GCCGCACCGT	CTCTTTCCGT	GGCGGGCAAC	CACACTGTGC	AAGCGGGCTA
11341	TCAACAAGAC	CTTACGGCGC	TAGACAACGG	AGAAGGTTGC	ACTCAACCCC	GCAACGCTAA
11401	CTCGTTGGTG	GTTTGGTCCT	GCCGGAATAT	AACCCGGAAT	CAACCGATTA	CTGGCAAACC
11461	TGCGTTTGCG	CCTGGTTAAC	CTGCGCCATA	ATCCTTCCAT	GACGGGCAAC	CGTTATCGCT
11521	GGCGAATTAC	GCGAGCCTAC	GATCCGAAAG	CGCTGCTCAC	CAGTATGGTA	CAGCCTTCTC
11581	AGGGCGGTAG	TGCAGTGCTG	CCCGGCACAT	TGTCGTTATA	CCGCTTCCCC	GTGATGCTGG
11641	AGCGGGCCCC	CAATCTGGTA	GCACTAATTAA	CCCAGTTCGG	CACCTCTCTG	CTCAGTATGG
11701	CAGAGCATGA	TGATGCCGAT	GAACTACCA	CGTTGCTACT	ACAGCAGGGT	ATGGAACCTGG
11761	CGACACAGAG	CATCCGTATT	CAGCAACGAA	CTGTGATGA	AGTGGATGCT	GATATTGCTG
11821	TATTGGCAGA	GAGCCGCCGC	AGTGACAAAA	ATCGTCTGGA	AAAATACCAG	CAGCTGTATG
11881	ACGAGGATAT	CAACCACGGA	GAACAGCGTG	CGATGTCACT	GTTTGATGCG	GCGGCAGGTC
11941	AGTCTCTGGC	CGGGCAGGCG	CTCTCAGTAG	CAGAAGGGGT	GGCTGACCTA	GTTCCAAACG
12001	TGTTCCGTTT	CGTTTGTTGG	GGCTAGTCGT	GGGGGGCAGC	ACTGCGTGCT	TCCGCTCCCG
12061	TGATGTGCGT	TTCTGCCACA	GCTTCCCAAT	ATTCCGCAGA	CAAAATCAGC	CGTTCGGAAG
12121	CCTACCGCCG	CCGCCGTCAG	GAGTGGGAAA	TTCAGCGTGA	TAATGCTGAC	GGTGAAGTCA
12181	AACAAATGGA	TGCCACCGTG	GAAAGCCTGA	AAATACGCGG	CGAAGCAGCA	CAGATGCAGG
12241	TGGAATATCA	GGAGACCCAG	CAGGCCCTA	CTCAGGCTCA	GTTAGAGCTG	TTACGAGCTA
12301	AATTACAAAA	CAAAGCGCTT	TACAGTTGGA	TGCGCGGCAA	GCTGAGTGCT	ATCTATTACC
12361	AGTTCTTTGA	CCTGACCCAG	TCCTTCTGCC	TGATGGCACA	GGAGCGCTG	CGCCGCGAGC
12421	TGACCGACAA	CGGTGTTACC	TTTATCCGGG	GTGGGGCCTG	GAACGGTACG	ACTGCGGGTT
12481	TGATGGCGGG	TGAAACGTTG	CTGCTGAATC	TGGCAGAAAT	GGAAAAAGTC	TGGCTGGAGC
12541	GTGATGAGCG	GGCACTGGAA	GACATCCGTA	CCGTCTCGTT	GGCAGCTGCT	TATCAGGCCCT
12601	TATCATCAGA	CAACTTTAAT	CTGACCGAAA	AACTCACGCA	ATTCTGCGT	GAAGGGAAAAG
12661	GCAACGTAGG	AGCTTCCGGC	AATGAATTAA	AACTCAGTAA	CCGCCAGATA	GAAGCCTCAG
12721	TGCGATTGTC	TGATTTGAAA	ATTTTCAGCG	ATACCCCGGA	AAGCTTTGGC	AATACCCGTC
12781	AGTTGAAACA	AGTGAGTGTC	ACCTTGCCGG	CGCTGGTTGG	TCCGTATGAA	GATATCCGGG
12841	CGGTGCTGAA	TTACGGCGCG	AGCATCGTCA	TGCCACGCGG	TTGCAGTGCT	ATTGCTCTCT
12901	CCCACGGCGT	GAATGACAGT	GGTCAATTTA	TGCTGGATTT	CAACGATTCC	CGTTATCTGC
12961	CGTTTGAAGG	TATTTCCGTG	AATGACAGCG	GTAGCCTGAC	GTTGAGTTTC	CCGGATGCGA
13021	CTGATCGACA	GAAAGCGCTG	CTGGAGAGCC	TGAGCGATAT	CATTCTGCAT	ATCCGCTATA
13081	CCATTGTTTC	TTAATTAATA	CATTGTGATA	GGCAGGCTCC	TGAGGGAGCC	TGTTTAAGGA
13141	GTTTTTATGC	AGGGTTCAAC	ACCTTTGAAA	CTTGAAATAC	CGTCATTGCC	CTTGGGGGCG
13201	GGATGACTAA	AAGGAATGGG	AGAAGCACTC	AATGCCGTCC	GAGCGGAAGG	GGAGCGTCAT
13261	TTTCACTGCC	CTTGCCGATC	TCTGTCCGGC	GTGGTCTGGT	GCCGGTGCTA	TCACTGAATT
13321	ACAGCAGTAC	TGCTGGCAAT	GGGTCAATTC	GGATGGGGTG	GCAATGTGGG	GTGGGTTTTA
13381	TCAGCCTGCG	TACCGCCAAG	GGCGTTCGCG	ACTATACGGG	ACAAGATGAG	TATCTCGGGC
13441	CGGATGGGGA	AGTGTGAGT	ATTGTGCGG	ACAGCCAAAG	GCAACAGAG	CAACGCAACG
13501	CAACCTCACT	GTTGGGGACG	GTTCTGACAC	AGCCGCCTAC	TGTTACCCGC	TATCAGTCCC
13561	GCGTGGCAGA	AAAAATCGTT	CGTTTAGAAC	ACTGGCAGCC	ACAGCAGAGA	CGTGAGGAAG
13621	AGACGTCTTT	TTGGGTACTT	TTTACTGCGG	ATGGTTTAGT	GCACCTATTC	GTTAAGCATC
13681	ATCATGCACG	TATTGCTGAC	CCGCAGGATG	AAACCAGAAT	TGCCCGCTGG	CTGATGGAGG
13741	AAACCGTCAC	GCATACCGGG	GAACATATTT	ACTATCACTA	TCGGGCAGAA	GACGATCTTG
13801	ACTGTGATGA	GCATGAACCT	GCTCAGCATT	CAGGTGTTAC	GGCCACCCGT	TATCCTGGCA
13861	AGTCCACTAT	GGCAATACTC	AGCCGGAAC	CGCTTTTTTC	GCGGTAAAAAT	CAGGTATCCC
13921	TGTTGATAAT	GAATGCTGTT	TTCATCTGGT	ATTTGATTAC	GGTGAGCGCT	TATCTTCGCT
13981	GAACCTCCGT	CCCGAATTCA	ATGTGTGAGA	AAACAATGTG	TCTGAAAAA	ATGTGTCTGA
14041	AAAATGGCGT	TGTCGTCCGG	ACAGTTTCTC	CCGCTATGAA	TATGGGTTTG	AAATGGAAC
14101	CCGTGCTTGG	TGTCGCCAAG	TTCTGATGTT	TCATCAGCTG	AAAGCGCTGG	CAGGGGAAAAA
14161	GGTTGCAGAA	GAAACACCGG	CGCTGGTTTC	CCGTCTTATT	CTGGATTATG	ACCTGAACAA
14221	CAAGGTTTCC	TTGCTGCAAA	CGGCCCGCAG	ACTGGCCCAT	GAAACGGACG	GTACGCCAGT
14281	GATGATGTCC	CCGCTGGAAA	TGGATTATCA	ACGTGTTAAT	CATGGCGTGA	ATCTGAACTG
14341	GCAGTCCATG	CCGCAGTTAG	AAAAAATGAA	ACGTTGTCAG	CCATACCAAT	TGGTTGATTT
14401	ATATGGAGAA	GGAATTTCCG	GCGTTACTTT	ATCAGGATAC	TCAGAAAACC	TGGTGGTACC
14461	GTGCTCCGGT	ACGGGATATC	ACTGCCGAAG	GAACGAATGC	GGTTACCTAT	GAGGAGGCGA
14521	AACCACTGCC	ACATATTCCG	GCACAACAGG	AAAGCGCGAT	GTTGTTGGAC	ATCAATGGTG
14581	ACGGGCGTCT	GGATTGGGTG	ATTACGGCAT	CAGGGTTACG	GGGCTACCAC	ACCATGTCCAC
14641	CGGAAGGTGA	ATGGACACCC	TTTATTCAT	TATCCGCTGT	GCCAATGGAA	TATTTCCATC
14701	CGCAGGCAAA	ACTGGCTGAT	ATTGATGGGG	CTGGGCTGCC	TGACTGTACG	CTTATCGGGC
14761	CAATAGTGT	ACGTGTCTGG	TCAAATAATC	CGGCAGGATG	GGATCGCGCT	CAGGATGTTA
14821	TTCATTTGTC	AAATAAGCCA	CTGCCGGTTC	CCGGCAAAAA	TAAGCGTCAT	CTTGTGCGAT
14881	TCAGTGATAT	GACAGGCTCC	GGGCAATCAC	ATCTGGTGGA	AGTTACGGCA	AATAGCGTGC
14941	GCTACTGGCC	GAACCTGGGG	CATGGAAAAAT	TTGGTGAGCC	TCTGATGATA	ACAGGCTTCC
15001	AAATTACGGG	GAAACGTTTA	ACCCCCACAG	ACTGTATATG	GTAGACCTAA	ATGGCTCAGG

SUBSTITUTE SHEET (RULE 26)

Fig.2.



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15061 CACCACCCGA TTTTATTTAT GCCCGCAATA CTTACCTTGA ACTCTATGCC AATGAAAGCG
15121 GCAATCATTG TGCTGAACCT CAGCGTATTG ATCTGCCGGA TGGGGTACGT TTTGATGATA
15181 CTTGTGCGTT ACAAATAGCG GATACACAAG GATTAGGGAC TGCCAGCATT ATTTTGACGA
15241 TCCCCCATAT GAAGGTGCAG CACTGGCGAT TGGATATGAC CATATTCAAG CCTTGGCTGC
15301 TGAATGCCGT CAATAACAAT ATGGGAACAG AAACCACGCT GTATTATCGC AGCTCTGCCC
15361 AGTTCTGGCT GGATGAGAAA TTACAGGCTT CTGAATCCGG GATGACGGTG GTCAGCTACT
15421 TACCGTTCCG GGTGCATGTG TTGTGGCGCA CGGAAGTGCT GGATGAAATT TCCGGTAACC
15481 GATTGACCAG CCATTATCAT TACTCACATG GTGCCCTGGG TGGTCTGGAA CGGGAGTTTC
15541 GTGGTTTTGG GCGGGTGACG CAAACTGATA TTGATTCACG GCGGAGTGCG ACACAGGGGA
15601 CACATGCTGA ACCACCGGCA CCTTCGCGCA CGGTAAATTG GTACGGCACT GGCGTACGGG
15661 AAGTCGATAT TCTTCTGCCC ACGGAATATT GGCAGGGGGA TCAACAGGCA TTCCCCCATT
15721 TTACCCACG CTTTACCCGT TATGACGAAA AATCCGGTGG TGAATGACG GTCAAGCCGA
15781 GCGAACAGGA AGAATACTGG TTACACTCGAG CCTTAAAAGG AATCTGTTTA CGCAGTGAGC
15841 TGTATGGGGA TGATGATTCT ATACTGGCCG GTACGCCCTT TTCAGTGGAT GAATCCCGCA
15901 CCGAAGTACG TTTGTTACCG GTGATGGTAT CGGACGTGCC TGCGGTACTG GTTTCGGTGG
15961 CCGAATCCCG CCAATACCGA TATGAAGGGG TTGTTACCGA TTCCACAGTG CAGCCAAAAG
16021 ATTGTCCTTA AATATGATGC GTTAGAGTTT CCGCAGGACA ATCTTGAGAT TGCCTATTCC
16081 AGACGTCCAC AGCCTGAGTT CTCGCCTTAT CCGGATACCC TGCCCGAAAC ACTTTTCACC
16141 AGCAGTTTCG ACGAACAGCA GATGTTCTTT CGTCTGACAC GCCAGCGTTT TTCTTATCAC
16201 CATCTGAATC ATGATGATAA TACGTGGATC ACAGGGGCTT TGGATACCTC ACGCAGTGAC
16261 GCACGTATTT ATCAAGCCGA TAAAGTGCCG GACGGTGGAT TTTCCCTTGA ATGGTTTTCT
16321 GCCACAGGTG CAGGAGCATT GTTGTGCTCT GATGCCGCG CCGATTATCT GGGACATCAG
16381 CGTGTAGCAT ATACCGGTCC AGAAGAGCAA CCGCTATTTC CTCCTGTTGT CCGATACATT
16441 GAAACCGCAG AGTTTGATGA ACGATCGTTG GCGGCTTTTG AGGAGGTGAT GGATGAGCAG
16501 GAGCTGACAA AACAGCTGAA TGATGCGGGC TGGAAATACG CAAAAGTGCC GTTCAGTGAA
16561 AAGACAGATT TCCATGTCTG GGTGGGACAA AAGGAATTTA CAGAATATGC CGGTGCAGAC
16621 GGATTCTATC GGCCATTGGT GCAACGGGAA ACCAAGCTTA CAGGTCAAAC GACAGTGACG
16681 TGGGATAGCC ATTACTGTGT TATCACCGCA ACAGAGGATG CGGCTGGCCT CCGTATGCAA
16741 GCGCATTACG ATTATCGATT TATGGTTGCG GATAACACCA CAGATATCAA TGATAACTAT
16801 CACACCGTGA CGTTTGATGC ACTGGGGACG GTAAACAGCT TCCGTTTCTG GGGGACTGAA
16861 AACGGTGAAG AACAAGGATA TACCCCTGCG GAAATAGAAA CTGTCCCCTT TATTGTCCCC
16921 ACAACGGTGG ATGATGCTCT GGCATTGAAA CCGGSCATAC CTGTTGCAGG GCTGATGGTT
16981 TATGCCCTCT TGAGCTGGAT GCTTCAGGCC AGCTTTTCTA ATGATGGGGA GCTTTATGGA
17041 GAGCTGAAAC CGGCTGGGAT CATCACTGAA GATGGTTATC TCCTGTGCGT TGCTTTTCGC
17101 CGCTGGCATC AAAATAACCC TGCCGCTGCC ATGCCAAAGC AAGTCAATTC ACAGAACCCA
17161 CCCCATGTAC TGAGTGTGAT CACCGACCGC TATGATGCGG ATCCGGAACA ACAATTACGT
17221 CAAACGTTTA CGTTTAGTGA TGGTTTGGG CGAAACCTTA CAAACAGCCG TACGCCATGA
17281 AAGTGGTGAA GCCTGGGTAC CTGATGAGTA GTGGGCGAAA ATCAAGGCGC ATCAAGGCGC
17341 CCCTGAAACG GCGGATTACA AATTTCCCGT TGGGCAATTT CCGGACGTA CAGAATATTA
17401 ACGGGAAAAG GCAAAGCCCC TGCGTTACGT TTCAAACCGT ATTCCTGAAA TAATTTGGGC
17461 AACTATGTCA AGTTGACCAA AAAATGCCCG GCAGGATATG TATGCCGATA CCCATTACTA
17521 TGATCCGTTG GGGCGTGAAT ATCAGGTTAT CACGSCAAAG GCGGGTTGCG TCGATCCTTA
17581 TTCATCTCCT GGTTTGTTGGT GAATGAAGTT GAAATAGACA CTCCCGTGTA ATGACAGCAT
17641 AAAGCTCAGT GATGCCTGTT CACTGAACAG ACATCACTCC ATTTAGGAAT GAATCATGAA
17701 GAATTTCTGT CACAGCAATA CGCCATCCGT CACCGTACTG GACAACCGTG GTCAGACAGT
17761 ACGCGAAATA GCCTGGTATC GGCACCCCGA TACACCTCAG GTAACCGATG AACGCATCAC
17821 CGGTTATCAA TATGATGCTC AAGGATCTCT GACTCAGAGT ATTGATCCGC GATTTTATGA
17881 ACGCCAGCAG ACAGCGAGTG ACAAGAACCG CATTACACCC AATCTTATTC TCTTGTCTATC
17941 ACTCAGTAAG AAGGCATTGC GTACGCAAAG TGTGGATGCC GGAACCCGTG TCGCCTGCA
18001 TGATGTTGCC GGGCGTCCCG TTTTAGCTGT CAGCGCCAAT GCGGTTAGCC GAACGTTTCA
18061 GTATGAAAGT GATAACCTTC CGGGACGATT GCTAACGATT ACCGAGCAGG TAAAAGGAGA
18121 GAACGCCTGT ATCACGGAGC GATTGATTTC GTCAGGAAAT ACGCCGGCAG AAAAAGGCAA
18181 TAATTTGGCC GGCCAGTGCG TGGTCCATTA TGATCCCACC GGAATGAATC AAACCAACAG
18241 CATATTGTTA ACCAGCATAC CTTGTCCAT CACACAGCAA TTAGTGAAAG ATGACAGCGA
18301 AGCCGATTGG CACGGTATGG ATGAATTTGG CTGGAAAAAC GCGCTGGCGC CGGAAAGCTT
18361 CACTTCTGTC AGCACAACGG ATGCTACCGG CACGGTATTA ACGAGTACAG ATGCTGCCGG
18421 AAACAAGCAA CGTATCGCCT ATGATGTGGC CGGTCTGCTT CAAGGCAGTT GGTGGCGCT
18481 GAAGGGGAAA CAAGAACAAG TTATCGTGAA ATCCCTGACC TATTCGGCTG CCAGCCAGAA
18541 GCTACGGGAG GAACATGGTA ACGGATAGT GACTACATAT ACCTATGAAC CCGAGCCGA
18601 ACGAGTTATT GGCATAAAAA CAGAACCTCC TTCCGGTCAT CCGCTGGGG AGAAAAATTTT
18661 ACAAAACCTG CGTTATGAAT ATGATCCTGT CGGAAATGTG CTGAAATCAA CTAATGATGC
18721 TGAATTACC CGCTTTTGGC GCAACCAGAA AATTGTACCG GAAAATACCT ACACCTATGA
18781 CAGCCTGTAC CAGCTGGTTT CCGTCACTGG GCGTGAATG GCGAATATTG GCCGACAAAA
18841 AAACAGTTA CCCATCCCCG CTCTGATTGA TAACAATACT TATACGAATT ACTCTCGCAC

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SUBSTITUTE SHEET (RULE 26)



Fig.2.

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18901	TTACGACTAT	GATCGTGGGG	GAATCTGACC	AGAATCGCAT	AATTCACGAT	CACCGGTAAT
18961	AACTATACAA	CGAACATGAC	CGTTTTAGAT	CACAGCAACC	GGGCTGTACT	GGAAGAGCTG
19021	GCGCAAGATC	CCACTCAGGT	GGATATGTTG	TTCAACCCCG	GCGGGCATCA	GACCCGGCTT
19081	GTTCCCGGTC	AGGATCTTTT	CTGGACACCC	CGTGACGAAT	TGCAACAAGT	GATATTGGTC
19141	AATAGGGAAA	ATACGACGCC	TGATCAGGAA	TTCTACCGTT	ATGATGCAGA	CAGTCAGCGT
19201	GTCATTAAGA	CTCATATTCA	GAAGACAGGT	AACAGTGAGC	AAATACAGCG	AACATTATAT
19261	TTGCCAGAGC	TGGAATGGCG	CACGACATAT	AGCGGCAATA	CATTAAAAGA	GTTTTTGCAG
19321	GTCATCACTG	TCGGTGAAGC	GGGTCAGGCA	CAAGTGCGGG	TGCTGCATTG	GGAAACAGGC
19381	AAACCGGCGG	ATATCAGCAA	TGATCAGCTG	CGCTACAGTT	ATGGCAACCT	GATTGGCAGT
19441	AGCGGGCTGG	AATTGGGACA	GTGACGGGCA	GATCATTAGT	CAGGAAGAAT	ATTACCCCTA
19501	TGGGGGAACC	GCCGTGTGGG	CACCCGAAAT	CAGTCAGAAG	CTGATTACAC	AAGCCGGCGT
19561	TATTCTGGCA	AAGAGCGGGA	TGCAACAGGG	TTGTATTACT	ACGGCTATCG	TTATTATCAA
19621	TCGTGGACAG	GGCGATGGTT	GAGTGTAGAT	CCTGCCGGTG	AGGCCGATGG	TCTCAATTTG
19681	TTCCGAATGT	GCAGGAATAA	CCCCATCGTT	TTTTCTGATT	CTGATGGTCG	TTTCCCGGTT
19741	CAGGGTGTCC	TTGCCTGGAT	AGGGAAAAAA	GCGTATCGAA	AGGCAGTCAA	CATCAGGACA
19801	GAACACCTGC	TTGAACAAGG	CGCTTCCTTT	GATACGTTCT	TGAAATTAAA	CCGAGGATTG
19861	CGAACGTTTG	TTTTGGGTGT	GGGGGTACAA	GTCTGGGGGT	GAAGCGGCCA	CGATTGCAGG
19921	AGCGTCGCCT	TGGGGGATCG	TCGGGGCTGC	CATTGGTGGT	TTTGTCTCCG	GGGCGGTGAT
19981	GGGGTTTTTC	GCGAACAACA	TCTCAGAAAA	AATTGGGGAA	GTTTTAAGTT	ATCTGACGCG
20041	TAAACGTTCT	GCTCCTGTTT	AGGTAGGCGC	TTTTGTGTGC	ACATCGCTTG	TGACGTCTGC
20101	ACTATTTAAC	AGCTCTTCGA	CAGGTACCGC	CATTTCCGCA	GCAACAGCGG	TCACCGTTGG
20161	AGGATTAATG	GCTTTAGCCG	GAGAACATAA	CACGGGCATG	GCTATCAGTA	TTGCCACACC
20221	CGCCGGACAA	AGTACGCTGG	ATACGCTCAG	GCCCGGTAAT	GTCAGCGCGC	CAGGACGGTT
20281	AGGGCACTAT	CAGGCGCAAT	TATTGGCGGC	ATATTACTTG	GCCGCCATCA	GGGAAGTTCT
20341	GAGCTGGGTG	AACGGGCAGC	GATTGGTGCT	ATGTATGGTG	CTCGATGGGG	AAGGATCATT
20401	GGTAATCTAT	GGGATGGCCC	TTATCGGTTT	ATCGGCAGGT	TACTGCTCAG	AAGAGGCATT
20461	AGCTCTGCCA	TTTCCACGCG	TGTCAGTTCC	AGGAGCTGGT	TTGGCCGAAT	GATAGGAGAA
20521	AGTGTGCGGA	GAAATATTTT	TGAAGTATTA	TTACCTTATA	GCCGTACACC	CGGTGAATTG
20581	GTTGGTGCAG	CCATTGGCGG	GACAGCCGCG	GCCGCTCATC	ATGCCGTTGG	AGGGGAAGTT
20641	GCCAATGCCG	CTAGCCGGGT	TACCTGGAGC	GGCTTTAAGC	GGGCTTTTAA	TAACCTCTTC
20701	TTTAACGCCT	CTGCACGTCA	TAATGAATCC	GAAGCATAAC	AATCATGTTT	ATTCCCACTT
20761	TGTCATGGAT	GACAAGGTGG	GTTTTTCGGA	TGTGTGGACA	GAGACCCGTA	CAGGGTCTCT
20821	GTCCAGTTAA	TTTTTGGATC	AAGAACGAAT	GSTGTAACGG	ATATGCAAAA	TGATATCGCT
20881	CAGGCTGAGC	AATAAGCTTT	TCTGTTTACC	ACTGATACCG	GGAAAACCTGA	GGGTTAATGT
20941	GCCTGTATCG	GCCACAGGAA	GCCCTTCAA	TGGCAGGTAC	TTAGCATCAT	TGAAATCCAT
21001	CTGGAATTGA	CCACTGTCTAT	TCATGCCATG	TGAGATCACA	ATCGCTTTGC	AGCCACGTGG
21061	CATCATTGTA	CTGCCGCCAT	AACCTAGTAT	TGCCCGGACA	TCCTGATAAG	GCCCTAAAAG
21121	GGCAGGTAAC	GTCACACTGA	TTTGTGTGAT	ACGGCGTGTA	TTACCTAAAC	CGTCAGGATA
21181	ATCGGTAGCA	ATATTCAGAT	CCGATAATTT	GAGGCTGGCT	TGCAGTTGTG	TCCCTTCGAC
21241	GTTCAAACCG	TTAAGCGTTG	TGCCTGCACT	GCCTTCACCT	GCATTGACTA	ACTCAGTCAC
21301	TTTATCTTTT	AAAATGAAAC	TATTTTCTGT	CAGACCAGCA	TACACTTCAG	CCAGAGAAAC
21361	GGTTCTGGTG	ACCTCCAGTG	CCCGTTTCAT	TTTTTCCAAA	TAGCTTTTTT	CCATCTGTGC
21421	TAAATTCAGC	ATCAGGTTT	CACCCGCTAA	TAAACCCGCA	TAACTCCCAT	GCCAAAGCAC
21481	TGGTTTAATA	AAGTGTGCTG	CCGCATTATT	CAATTCATAC	TGATAAGTTT	GCTCTGCCAT
21541	TAAACAGAGT	GAGACCGCCA	AATCATAAAA	CTGATAATAA	ATAGCGGACA	ACGTTCCACG
21601	GAGCCAGTTG	TATAGCGCTG	CATTACTGAA	TTTACTTTGC	AGAAAGGCTA	ACTGCGCCTG
21661	AGTTTGTGCC	TGCTGAGTTT	CCAGATAGTT	TTTTTGTAAT	ACTGCCGCTT	CACGACGTAC
21721	AGCCAGCGTC	GCTAATTGAG	CATCAATTTG	TTTTATCTCA	GCTTCCGCAT	TATTGCGCTG
21781	AATTTCCAC	TCTTGCCGAC	GGCGACGGTA	TATTTCTGAT	TGGCTGATTT	TGCTGCGGC
21841	AATACGTGTT	GCTGACGCAG	AAATTTTCGAT	ACCAATCGCA	CTGGCATTGA	AAAGCGCCCC
21901	AAAACGGGAA	CCTCCACACG	CAAAACCGTA	AATATTGGGG	ACGAGATCTG	CCGCGGCGGC
21961	GGCCATATGC	AGGGCTGTGC	CGCTGGTGCT	CAAGACCGAT	GAAGAGAGGT	AAAGATCCAT
22021	GCCTTGTTTT	TCACCAGCGT	TAACATCTTC	GTCGTACAGC	GTATTGAAAC	TGTCAAAACG
22081	AGACTGTGCA	CCATGACGGC	TTTCTTGAAG	CGCCAATTTA	TCAGCATCAA	TTTCAGCCAT
22141	GACCTTATCC	TGCATTTTAA	TACTTTGCAG	GGCTAACTCA	TGCTTTGAG	TTTGCAGTAT
22201	TTAGCCCAAG	GCTTCTGCAT	CCTGCCGTTT	AGTAATGCTG	AGCAGGGTAT	TGCCAAATTG
22261	TATCAACTGG	CTTACCCCCC	ACTTGGCATT	TTCCAGAATC	ACCGGAAAAC	GGTACATCGG
22321	CATCACTGCA	TGAGGTAAAT	CGCCGCCGCG	TTGTGAAGCA	GTGATGGCAG	CACTGAGTAA
22381	CATGACGGA	TCTGCGGGCG	TGGCATAGAG	AGATAATGAC	AGTGGCTGAC	CGTCGATTGT
22441	CAGGTTATGG	CGTAAGTTAT	AGAGGCGTTG	CGTCAATGTC	TGCCAGTAAC	CTTGCACTTT
22501	TTTATTAATT	TGAGGGAGGA	ACAATGCGGT	TAACGAAATT	TGCCGTACGT	TTCTGTTGGT
22561	ATGCAGCGCG	CTGACGCAGT	TGCAGCATTT	TATGTTGATA	ATGATGCCGC	ATTGTTTGGC
22621	TGGCAGCTTC	TTCCAGCCGT	GGCTCTGACC	AATCGTTATC	CAATGAAAAA	TAAGGCTCAT
22681	CACCCAATAA	AGTGAGCGCC	TGTACATACC	ACATTTTAGC	TTCTTTTAA	GTATCAGCTT

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Fig.2.

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22741	CAAGCTGGCG	ATAGGCGCTA	TCTCCGCGGG	TAATCAACAA	ATCCAGCATT	TTCATAAAGG
22801	TAGCCACTTT	ATAGTGCATC	GGATCATGCT	GGGCAACGGC	GTCCGGATCG	ACCGAATCCA
22861	GCGGATTGGC	ATTCCAGGAC	GTATCTTCCT	CCAATGGGCG	GACGTTCCAG	TAATAATCCT
22921	GCATTTTACC	CTGAACCGAA	TATCCGGTCG	GGTTCAGATA	TAGCGCAGCC	AGCGTGTCTGA
22981	TCCGGTAAAA	TCTGCTCTTG	CAATAAGCGC	TGGAATACCA	TCATGGGCGT	TGTAATAGAA
23041	CAATCCCAAG	AAATAGATTG	CATTGGCGCC	GTTTGAAATC	CATGGGTTCA	GTGTTATTTT
23101	TCATGACACG	ACTTGAATAC	CCCTTTTATA	TTTTTTGATA	TTTTTTACTA	TCCCCTGTTG
23161	TGTCATTCCC	GAATCATGAT	CGGCATCATT	AGTGAATATA	AATTGATTTT	TCGTCTCATC
23221	AAAATAAAAG	AAAGCAGATT	CCCAGGATTT	GTCATAGATA	ATTTTTTTGT	ACCCAACCCC
23281	TAATCTGACA	CCTTCACGTA	TGTAATATCC	TTTAGCATAG	GGAACAAAGA	GCGTTACTGT
23341	GGTTTCAATA	TCAGATAACA	TTCTTTCGTA	ATAAGGTTGT	CTGGCAGAAT	TGCCATCAAT
23401	ATTCCCAATA	TGGATCTTAA	ACCAACGTTT	ATCACCATGC	TCCTCTTTAT	TGTAGGGGGG
23461	CAACTTAAAT	GTCGCATAAA	ACCCTTCACC	TAATTGCGGC	TCTGGTAAAT	TTTGC GTTTC
23521	CATACTTAAA	ACATTATCAA	TACCAATATT	GGCTCTTTCA	GCTAATTTTC	TGGAAAATAA
23581	AGTATTTAAC	CGGGTTCTGT	AAGGGCCAAT	CTGCATATAT	TGTGTGCCTG	ATGGCATTIT
23641	ATGCAGTGAT	ATAACGTTAC	TTGTAFTCTT	GGATTTTAGT	TTTATATGAA	TTGGCGATTTC
23701	AATAACAATA	TCGTTATAAC	CGCGTCGGG	TTGCTTAATA	ATAAACTCGC	TCACCAGAGG
23761	AATATCATAG	CCTTCAATAT	CAACTTTTAC	TTGATTAAAA	TCATATACCA	TAGGGTCAGA
23821	TTCGTGTGAA	GGTTTAGATG	CCACATGGTC	TTCAGCATT	AACTCCACTA	GAATATCAGA
23881	GCCATTTTTT	AATAAAAAAC	TAATGTTTTT	ATCTTGGATC	TGTTTCGATCA	TAGATGAAGC
23941	AAGTTTTATT	ATCTGTGGCT	GGTTGAACAT	AAATACACCC	ATGGATCCTC	GCGAAGGAAC
24001	AGTGCCGCAA	TATTTCCCAT	GGTATTAATG	ATTGAAACAT	CATTAGTAAA	CATTGACAT
24061	ATAGTATGCC	ATACTCCTGT	GTTATCTTTC	CAATCTAATA	CTATGTTAGT	ATCAAGTTTG
24121	AATTCAGCAT	CATCTGATTC	ATAATCATAA	TTTATACCAA	CTCCAATTTT	TGATTTTCTA
24181	GGAAATTTTT	CCTTGGTTCT	TAGATGCATT	AACACTCTAA	AATATTCGGC	ATTTTTAAGA
24241	TCGATGGAAA	TAATAAAATC	CAAAGTTCCA	TAATGAAAAA	CTTCTTCTTC	TTTTCCAAGC
24301	ATTTTCATCAT	GTCTATCATA	ATCAAAATAA	ATAACCGTTT	CATCTTCTAC	CATCGATAAC
24361	AGGTATTTAA	CCTCATCATT	ATATATATTG	CCTTTTGAAA	AATTAATTTT	CATTGAAGGA
24421	TTGAACGTTA	AATTAATATG	ACCATTTTCT	GGTGATATAT	ACGAGAGATC	AAAAATATTT
24481	CCGGTAAAAC	TGGCTAATTT	ATTTTTTGTT	GTTATAGATT	CCTTATATTC	GGCCAAATAA
24541	TCTGTAGCAA	ATTGATTGTT	GACTTTGTAT	TCTGTCTCTG	TATCAAGTTT	TGATAATGTG
24601	CTCTTAACAA	TGGCGTCTAA	ATCATTTTCT	GTGAGAATGG	ATAATGTGAT	ATCAGGTTTA
24661	ATGTCATCC	CTTCTCTTGC	AGGAAGACTA	TTAAAAAGAA	ATATGTCTTT	TTTCTCATGG
24721	AAATAAACAA	TAATGACGTC	TTTTTCATAA	TCAGAAGAAC	AATACATACC	AATGCTGGCT
24781	TTTTTATTGA	TCAGGTTTTT	TATTTTATCA	GTCACATTAA	AATTAACCGG	TGAGCTCCAG
24841	CTGCCATCAT	AACGAATATG	TGACAGTTTT	AATATATAAT	CAGTGATATC	TATCTTGCCA
24901	TCTTCACTTT	CATTTTTTCAG	CTCTTTTTGT	TCCAGCCACA	GTAAATACAA	ACGAGACTTG
24961	TAAATAACAG	GTCTGATATT	TTCTGCCAT	ACATTGATGG	GTATTTCAAT	TTTTTTCCAT
25021	TATCCCCAGG	CATTGGCAGC	AAATTGACCG	TGCTGGCACT	TTTGGTGATC	GACATTGCGC
25081	CAATAATATA	TTCTGGGTTT	TGTCTGGCTA	TAACCAATTA	AATAAGTGAG	CCCCTCATTG
25141	ACATTAATAC	TGTCATGATA	TCCGCTAATC	ACCTGCAAGT	TAGCGACATC	TTCAAATGCG
25201	GTCAGATAAT	TTTTAAAGCT	ATCTTCAACG	GTATCGATAT	TTAACTGACT	TTGGGAAAGT
25261	TGCTGTAAAC	GGTTGTTTCA	CATACCTGTC	TGACCAATAC	GAATCGTGGG	GTGATATAG
25321	TTTCCGGAT	AATAGGCCAG	TTCAGATACG	CCGGCCCAGG	TGCTATACCG	TCGATTGTAG
25381	GTTTCCAGT	CGCAGAAGAA	CTGACGGGTT	TTCACTGGCT	TTGATACTTT	TCCTTCAACA
25441	TTATTCAACG	CCCGGTTGAC	ATATAACTGA	ATGCTGGCAA	TGGCTTCTGC	CACACGGGTG
25501	GTTTTCACCT	GGGCAGAAAC	TTGGTTATCA	ATCAGCAGAT	AGCTGTACAA	CTCATCCCGG
25561	CTCTTAATCT	GTTGAGGTGC	ACCATTTTTG	ATGTAGTAAG	CATGGCCGTC	TGTCGTCTGT
25621	GCTTCATCCA	GCCATGCCTG	AAGCTGGTCG	GATTGTTGAC	TGTTCACTCC	CGCCTGCAAC
25681	AAAGTACTGG	CGGCTTGCCA	ATCATCAAAT	GTTGGCATCG	GGGTTTCCGG	TTCACCGACA
25741	TATTTTAATT	TTATGAGTGC	AGCAACACCA	TCCGGGGTAA	TACCCAATGT	AGCAGCGACA
25801	TCCAGCCATT	GCAGAGTGAC	ATCTATAAGT	TCTCCAGTTG	GTAAAGGTAT	TCACTCCCAA
25861	ACCGGTCTGT	TGCAATGCTT	GTGTCACAAC	CTGAGCATCA	AAATTTTAAC	GCCACCGCCA
25921	AATTGTTCCG	CAGTCAACGC	TCTTAAGTTT	CAAATGCTGT	TAAGATTCTG	TCCGCTAGCT
25981	TCACAACGCA	TGATCACAGC	ATGGAAGCGG	GTCAGCGCTT	GCAAAGTGGG	GAGATCATGT
26041	TGCAGTGCTG	TGGTTTCTGA	TTGGAATTTT	TCCGGTTTTG	TCACCAACAG	GGTCAGTTTC
26101	TTTTCGCTGA	GTCCAATATT	GCGCACAATC	AGAGAAAGTT	GCCCCAGTAC	CTGACAAAAA
26161	GCCACCATGT	TGCTGGTTTT	ATTCTCTGAG	CGATCACGGT	TAGCCGCAAT	AATCATGAAA
26221	TCATCGAATG	TCAGTCCTTG	TGCTTTTATC	TGATTAATCC	ACAGCAAAAT	AGTTTCTGCT
26281	GTTTGGCTG	AATCCATTTG	AATGCTGGCA	GCAATCAGCG	GGGCAGCTGC	ACGGATCAGT
26341	TCGTATCAC	CGAGTGAAAG	TGTTGATAAT	CCATTACTTA	GTGTCGTGAT	AAGGTTTTCA
26401	ATA'CCGGCG	TAAGGACAGT	GCTGTAATTA	TCCGTGGTCA	TCAGAAACAC	ATCACTGACA
26461	GACCATTTC	GTGTTGTCAG	CCACTGGGTG	CATTGGAACA	GAAAGCTGAT	TAATTGCGTT
26521	AATGCTGTAT	CAGAAAAAAG	GGCAATTTTC	GTGTTACAT	AGGGAGAAAC	CGACAACAAC

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Fig.2.

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26581	ATGGATAATT	CATTCACTGT	CAGATGATGA	ATGTCTGCCA	GCAGACGAAC	GCGATAAAGC
26641	AGAGACAGGT	TCTCGATGGA	ACACATAAAT	TCTGGATTTC	TTCCGCCATT	AGCCAGTTTC
26701	CATAATGTAT	ACAGTTCAGT	ATCATTCACT	CTGAAAGCAC	GTTTCATTAT	TCCCAAATAA
26761	AAATGGTTTT	TTGATTCAAC	GGGGGTTAAA	TCCAGTTTGG	TATTATCAGC	AGAAAACCTC
26821	TGGCCATTTA	ATAGCGGTGT	ATTGAACAGC	ATTGTAAAAA	GACTGGGGTG	TTGTTTAGTG
26881	GAATATTGGC	TGATATCTGA	ATGACACAAT	ACCAGCGCAT	CGCTGACGCT	AATATTATAG
26941	TGCTGCATAT	AATATTGAAC	ATAAAACAGC	TTACCCAACA	CATTGCTGTC	AATGGTTAAG
27001	TCATCATAAA	TACTTTCTAT	TACTTGCCAG	ATATCTTCTG	GAGATATGCC	TGTGGCTTTA
27061	TACAAACGAA	TCGCTTTTAT	CAGCTTTAAC	AGGAATATAT	CACCGGGAAC	TCCATCATTT
27121	TAAAGTGTGC	ATTGGCATTG	ATAGCATCCG	ACGGATTTCG	TTAACTCGCC	ATAAGCGGAG
27181	TGTTATACCG	TTGGTGATT	GCTCTGTCGT	CAATTTAATG	GGAACTACTG	AATGGGTATT
27241	AGCAATGGGG	ACGAAATTTT	TATCTTGGTA	TATATATTCT	TTATCTCCAT	TCTGGAGACG
27301	AAAATCCAAG	TGGTCAGGTT	CTGTTTTTTT	TACACTGAAA	TTATATTGTT	ATTCATTTTT
27361	TTTGATTGGA	ATTAGCTCTG	CATAGTTTAA	ATGTGAATCG	TAGAAATCTT	TGCGGGTTCC
27421	CTTAATCAAT	CTTGCCGTG	CCGTATCATT	CCCGTCATTG	ACCAATGTTA	TCAGTTGCTC
27481	ATTCTTATAC	TGTTGATTG	TATTTTTCTT	ACCGAAGGAG	AGATTGACAA	ATAAACTGAG
27541	TTCATCATAA	GACAAATCGT	AGTAGCGAGC	CAAAGAAGCA	TAACCTTTAA	AAATCAGTAC
27601	ATCATCTGTA	CCGAAATTTT	TCTTCATCAG	TTCTGTTGAA	TTTTCCGGTG	TAATTTCTTC
27661	TACAAGGATT	TGATACAATT	CAGGCGATAT	ATCAGTCTTA	ATAGCCAGTA	GCGATGTTGG
27721	GTCCATTAAAT	TCCGCTACGT	CTGTATTACG	GCTAAATGCG	GTGAGGTTTT	TATCTTGCAA
27781	TAAAATTGCC	TGACGGGCTG	ACTCATACGG	CAGATGATAG	GGTGTCATGC	CGGTTTGCCG
27841	GTAAGTGGAC	AACATTTTCA	TTACACCGTT	ATAGTCAGTT	TTCTCTAACG	TCTGAATATT
27901	ATGCAGCAGT	AATTCATTAG	ATAAGGATAA	TGTGGAAATT	TCTTCATCCA	TATTAATTCTG
27961	TGTCAGTGCC	AGTGAAGCAA	TGTCGGGGCG	TCGTTTATTC	AGGTGATATT	GAGAATTGTC
28021	AGGATGAAAA	TCTTTTCGCT	CCCGATATAA	TTCTGTTAAA	TAAGCCGCTG	GTGAAAAATAT
28081	GGAAGCAATT	GATCCCGGTT	TTACAAAACG	GTGGGCGCGG	CCATAAAACC	AACGTGTTGA
28141	ACTATTGTTT	AGGGTTGACG	TGTAAATATT	AAGGTTAGTG	ATATTTAGCA	GATGTGGATT
28201	AGCACGGGAC	AAAATGCGCA	GTTCTTCAAG	TTTATTCTGT	TTTGATTCTT	GATGAGCCCTG
28261	TTGATATAAA	AAGTCTGTTT	CTCGCCACGT	CAGAGTTCCA	CTTGTCCTAT	GACGAAATTC
28321	GCTGAAAGAC	ATAAACGAAA	TGTTTGTCAA	TAATAAAGTA	TCACCAGCCT	TTTTCTATTT
28381	ATCTTATCTA	ACAGTTTCAAT	AACTTTTATC	ATATAAATCC	TTAAGTTATT	GTCATTTTAA
28441	TGATTAATGG	TTTTTAGGTG	GAGATTATTA	TAATCTGATA	GGAAATATT	GGTTAATTAA
28501	ATTGATACTG	ATTTATCGCT	CTATTCTTTC	AATAAAAAAT	AAAAGAACTC	CCTATAATAC
28561	ATGGATTTAA	ATAATGAATA	CCGTATGTTA	AAAATTAAAT	TTTAACAAAC	TTTCATGAAA
28621	AAATTCAACT	CAACAATTGT	TTAAATATTT	TTAATTGTGT	TTGTGCTGTT	TGAAAAATGA
28681	ATGACTAATA	TTTATCTATG	AAAGATTATT	TATTGAGGAT	GTCTTGCTTG	GTTTCAGGGG
28741	GCTACGTTGG	AGTCAGATAA	ATGTTGTCAA	AAAGAAATCC	TTAATAAAGT	TGCGTAATTA
28801	CAAAAGTTGG	TATATCGTGA	CAAGAGTGAT	AGTAATGTCA	CATAATTTAT	TGAATACCCG
28861	AACCTCGCAA	ATGCGGGGTT	TTTCTTCGCA	TAATCAAAGA	GAAAGCTATG	AAAAAAACAC
28921	TGATTACTCT	TATTCTCAGT	ACCCTTTCTT	TTGGTGCTTT	GGCACAGCAG	GGTGGCTTCG
28981	TTTCCCCGGA	CAGCACAGAC	TATACTCAGG	GTGGATTTAA	AGGTCCAATC	CCCAACCTGA
29041	CCAGCGTTGC	TCAAGCAAAA	TCTTTTCGTG	ATGATGCGTG	GGTGTTCTG	GAAGGAAACA
29101	TTGTTAAACA	GGTTGGTCAC	GAACTCTATG	AATTTCGCGG	CGCATAAATC	GAGTCACTAT
29161	AGGGATCGCT	TATTACGGAC	TTATCCGGAA	AGCTATCTGG	AACCCCTGTT	ACGCCTGAAT
29221	AAAACAGAAT	TCAGGGGATAA	CAGTGGTTCT	GTTTATGTTG	ACATTGATGA	TAAGCGCTGG
29281	ATGGGTCTGA	CGGCCACTCC	AAC TGACAAA	GTTTCGTATC	AAGGTGAAGT	GGACAAAGAC
29341	TGGAACAGTG	TTGAAATTGA	TGTAATAACT	ATCCGCATAG	TGAAATAACT	CAAGCACTTT
29401	GAATATAGCC	CCGCACTCGC	GGGGTTTTTT	GCTTTCTGGG	AGTCGGAAGT	TTAACCGTAG
29461	TGACGAGGAT	CAAAACTAAG	TTAACGGCAG	TGGTCACTGA	TTTGGTGCAT	AAGTTATCAA
29521	AAGTTAAAAA	TCAAAACTTA	TTTTTTATTT	AATAGAGGAA	TGTCACCCTG	TAGGTGAATA
29581	ACGTTGACGG	ATGTAAATAT	ACAGTATTAT	AGTCCTTTGA	TATGTTATTA	AATTGAAAAA
29641	CCTTTAAACT	ATATTGCGGG	GAAATTATTA	TGTCAGATGT	TCGTAATATT	ATTAATGTTG
29701	ATAACAATTT	TGGTTGTGAA	TATAAAGCGG	ATTTATTTAA	ATAAGTTTTT	ATAATTGTGA
29761	TACACCCATT	TTTCTCATCC	CCGGTTTTTG	CTGTTGTAAG	GAAGCGGTTT	CCATGAAGAT
29821	TTTGACATGG	TTAAGCAACT	GCCACATAAA	TTGGCAGCAG	TGGTTTCGTG	TCACGGTTTT
29881	ATGCAAGGAT	TGCCATAGAC	GTTCAATTTT	ATTCAACCAC	GGGCAATAGG	TCGGTAAAAA
29941	GAGAAGATTA	AATTTGGGAT	TCTTTGCCAG	CCAAACCCCT	ACCTTCCGGC	TCTTATGAAT
30001	GCAATAGTTA	TCTAAAATTA	ACGTGATGGT	TTTGGCATT	ACATATTGAT	TGTTAATTTT
30061	ATCTAACAAAT	TTGATAAATA	AATCTGAGTT	CTTTCTCAAG	CTACCGACAT	AAGTGATTTT
30121	TTTCGTTTTT	GCGTTGAGGC	AATTTGGCAAG	GTAGTGTTTT	TGGTTCTTTT	CGGGGGTAAC
30181	AACACGCTTT	TGTTGCCCTT	TGAAGCACCA	GTCTGCACCG	ATTTTCGGGT	TCAGGTTGAT
30241	GTCCACCTCA	TCCTCATAGA	AGACCCGGTG	TTTCTCTTGA	GGCATTTGAT	AACGCTTCGC
30301	TGATTTTTGC	CATTTTTTCA	TCTACTCAG	GGTCAGGCAA	TTTTACGGTT	GGTCCCGCCC
30361	TTCGCCAAAC	GATGCCCGTC	CGGCAAAAGT	AGCGATAGAG	GGTACTTTGA	GAGAGCGATG

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Fig.2.

30421	TATTCTAGTAG	CTCATTGATT	TTAAGTGTA	TAAGCTCAAG	GCTCCATCGT	GAACGGAGAT
30481	AGCCAAAATG	TTGTGGCGAG	TGCTGTAATA	AGAAAAGAAAT	GACTGTGAAG	AGCGGAGCTA
30541	AGTTCCAGAT	GGCAGGCCCTT	CCCGCCGGGA	GGCTTTTAAG	TCCTTCCAAC	CCGTATAATG
30601	TTAACCAATT	TACCCAACGA	TGAACGGAAG	AACGTGAACA	GTGAAGCGTT	CTGGAAACGT
30661	GAGAAACCGT	ACTCCCTTCA	TGTAACATCA	AGAGCGCGGT	GAAGCGACGT	GCATAGTCCT
30721	TATCCCGGGT	TTTCTGGATA	GCTTTTTTCA	TCCGACGTCG	TTCATTTCCG	GGTATTGATG
30781	TTATGATTGG	CATGACTCAG	TCCATTTTGG	GATTTGTTTT	GATTTGGCGA	TTAATCGAGAT
30841	CGCGAAAATC	GGACTGAGTT	CCCTTCAAGT	GATCTACTAT	TTTGAATCT	TATTTAATCA
30901	GGAGTCAGCA	AATGAGTTAT	TCCCATAAT	ACCTGACCAT	GTGGTTGTTT	ATCCGGGAAA
30961	TGATTTCATCT	ACCGGTGGTA	TGTGGATTCC	TTGGTGCAT	AGTCAGAAAG	ATATTGACTC
31021	TGGCCATTAT	ATCAAAGTTA	CTTTCAGTAA	AAAGGACGCT	GCTGATATTG	TGAACTACAT
31081	GTTTCAACAT	GGCAGTTATG	TTTATTTTAC	AGACAGTAGT	AAACAATTTA	GCAATAAGCA
31141	AATTATGTCT	GGTGATTTCAG	CTAAAGGCAA	AGGGGATTAT	AAGCTTGAAA	TTAAAACAAA
31201	CGGGAACCTT	CCACTGATGG	TATTGAATAA	ATATTGATTG	ATTATTATTT	ATGGATAAGA
31261	AATTAAGTTT	ATATTTTCATC	TGGTTTCTGC	AATTAAGTTT	TAAAAATTAA	TTCTACTTTT
31321	TTTATGGTTT	TATATTTAAT	GCCAATCATA	TTATTTTCT	TATAATAATT	GATAGTTTAT
31381	TTATATAGTA	AATAAATTCT	GTTGGATGTG	ATTATTATTG	TGAGACGGTA	ATAATTAAAC
31441	TAACAGAAAA	TTTATGGTTA	GGAAATTCAA	TCAACTTTTG	TCCGGTTTCC	TGACCATGAA
31501	GAGCTGTATT	TACTGTAGAA	CTCGCATTGA	TACTGGATTG	ATTAGCCGGA	CGAGTGTGG
31561	GTCAGCAGAT	AATATGTTGT	ATATTGGCTG	TGGATTTTTT	AGCGAGATGA	TAGCTTTGGC
31621	AGTAAAGGCG	ATTAATAACC	GATAAAACAG	AGAGACGGAT	TGTGGCCAGG	AAAGCAAAAA
31681	AGCTCACCA	TGACGCGTTA	TTCAAACATT	TTTTAACCCA	ACCAGAAACC	CGCCGGGAAT
31741	TTTATCCCT	TTATCTGCCG	GAAGCGATCC	GGTCAGTGTG	TGATTTACCA	CACTAAAACT
31801	GGAAACGGCA	GCTTTGTGGA	CAGGCAATTA	CGTCAGTTGC	ACAGTGATGT	GCTGTATTCT
31861	GTCGAGACAA	CCCACGGGGA	CGGTACATT	TATTGCCTGA	TTGAACACCA	GTCCACGCCT
31921	GATCCGTTAA	TGGCCTGGCG	GCTGATGTAT	TATTCGCTGT	CAGCCATGGC	TGCGCATCTG
31981	AAAAAAGGAC	ATACTGAACT	CCCTTTGGTC	GTCCCCCTGC	TGTTTATATCA	TGGTGAGGTG
32041	AGGCCTTACC	CTTACTCAAA	TGATGGCTG	GATTTGTTTA	CACTCTCTGA	ACACGCGGCT
32101	CACCTGTATA	ATCAGCCCTT	GCCGTTGGTG	GATATCAGTG	CGCTCAGTGA	TGAAGAGATC
32161	CTGACACATA	AAAGCATTGC	CTTGATGGAG	CTGGTACAAA	AACATATCCG	TTGCCGGGAT
32221	ATGCTGGAGT	GGGTTCCCCA	ATTGGTGGCG	TTGTTGAATG	CCGGTTATAA	TAGCGCCGAA
32281	CAGCGCCATG	TTGTGTTAAG	CTATATTTTA	CTGAATGGAC	ATACGCTGGA	TCTCGCCGAG
32341	TTTGTCCTATC	AACTGACTGA	ACAATCTCCG	GAGCATGAAA	CCATGTTGAT	GACTATTGCA
32401	GAACAGCTTG	AACAAAAAGG	GCGTGAGCAA	GGCCGGACAG	AAGGCAGAAC	AGAAGGCAGA
32461	GCTGAAGGAC	GGGAAGAAGG	CAAGCTGGAA	ACGGCGCGCG	CATTATTACG	GCATGGTGTC
32521	AGTCTGGACA	TCATTGTAC	CAGTACCGGC	CTGAGCCGGG	AGAAAAATTGA	AGCGTTAAAG
32581	CATTAAATGG	ATACGCTTTT	TCACGACAGG	ATATGGTGAC	CCCTGTGAGG	CCACCGGAAA
32641	ATTTTATTTA	CTACGATTTA	CGACGGGTTA	CTTTAGGAAG	CTGAATGAGA	CGTCCCTTGT
32701	TATATAACGG	TCCCATATCA	ATCTTCTCTT	TTCCGCGTAC	AGGTAAGTAA	CCCAAACCTT
32761	CGTGAGCAGC	ATTTGCCAAC	AGGCCATCAT	CCTGATCGCC	TGACCAAGAG	AAGATCCCGC
32821	CCAATTTTCAT	TTTGGTTGCA	TAAATTCCTT	TATGCAGCAC	AGTGCGGGGC	GTATCCAGTG
32881	AAATCCAGTG	ACCACCGTCA	GCATTAAGAA	GTGCGTCAGC	GTCCGTTTCC	GTGTCTGTCA
32941	CCAGTTCAAA	CTGATTTTTT	CCGCGTGCAA	TTTCATATTC	CGCATCGTAT	TGGTTATTCA
33001	GCAGACAGAA	GAATTCGCGA	GCACCTTTTT	CCATCGTGCC	CAGTGGCTCT	CCTGTTCTGT
33061	TATAGCGGCG	CGTTGTCAGA	TCAGCACCCA	GACATGAACG	TCCATAGTTA	GCAAATCCGA
33121	GGTGAATTTT	CTCCGTTTGT	ACACCTTGTG	ACAGTAAAAA	GCGGATCGCC	TCATCTGCCG
33181	AGTAATCCAT	GTCCCGATCA	GGATTGGGCG	GAGGAGGGTT	ATCGCCGTCA	TATTCATATC
33241	TGGGGGGATA	CAGGTTAGTA	TGGTGACCGA	TGTATTCTGC	CCAACCGGTA	CCAAAGAAGT
33301	CGTAGGTCAT	CACAAAGATA	TTGTCTAAAT	AAGGTGCGAT	TTCTTTGAAG	CTGGACTTCT
33361	CCATTTTGGC	AACGACGGCG	CTACAGGCTA	TCGTGATTTT	TTTACGGGCC	CGGGTTCCAA
33421	AGGCGATGTT	CAGTGCTTCA	CGCAGCTCTT	TCACTAACAA	AACATAGTTT	GGGCCATCAT
33481	GTTCCGGGTC	GAATTCATTA	CCTTCTTCAC	CTGTGGCGCC	GGGGTATTCC	CAGTCGATAT
33541	CCACCGCAGT	AAACATGGGA	AAACGCCGGG	AAGAAAGTCGA	CGATGCTACT	CACAAATGTA
33601	GCAGTTTGCT	CAGGATCTTT	GGCCATCACA	GAGAAATACC	CTGACATACT	CCAGCCGCGG
33661	ATACTGAATG	CGAGTTCCAG	CTTATGCCCT	GCCTGTTTTG	CTCGCGCTTT	CAGATTACGC
33721	AATCCCCCCA	GTAAACCGGA	GGCTGCATCC	TGATTGTAAT	ATTGCAAGAA	ATTCTTCGGG
33781	CTGGCATCAC	GGCGCTGATC	CGCGCTCAGA	CCGACATTGC	GTGTGGTGCC	TAAATCACCA
33841	TAAGGATCAA	CGGGTACAAT	ATGGCCTAAT	GTAATAGGGG	CAATCTGGCC	ACTGCTGGCT
33901	TCTGCTTGCC	GGTTCCACCC	GTCAACAACC	TCATTAATCC	GTTCCGATAA	CTTGCTTTTG
33961	TCACCGTTGA	CGGCCATAAA	ACTGAAAAATC	AGGCGGTCGT	AGGCGGTAGG	CGGGATTTTT
34021	TCCAGATCAA	AACCACGGCC	GGGGGCATCG	TCCGTGGTCA	GCGCAGTGTT	ATCCTGGGTT
34081	TCTGGCGACA	AACGCGCATC	ATACTGGCAC	CAGTCAGTAA	TATAGGCAGA	GACTTTAGGC
34141	AGCGGTTCTG	TATTTTCCGG	ATCAACTTCA	TATTCGTTGT	ACAGGGACTT	GGCAACACGT
34201	GCTGAAGAAT	AACTCAAAGG	AGTTCCGCTG	CCGTCAGGTT	TATATCCAC	CTTCTGATAG

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Fig.2.

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34261	GTTTCTTCTG	TGAGTGCATC	ATATTGCAAT	ACCTCGGTTT	TTTCTCCCGG	CGGTACATCA
34321	GGCGTATTGG	GGTTACCGTG	ATCGGCAATT	TCTTCCGGTG	TGCGCTCACG	GACATATTGC
34381	CAGGCATTCT	CATAAACCGG	TAAATCAGGT	GAAATATTGC	GGTCGGGAAT	ATGCCAGCGT
34441	TCAACCCAGC	CGATGTTTTT	AAAAACCGCG	CTATCATAAA	TGACATACCA	GGTTTGACCA
34501	CCAGATTGAT	TCTGCCAGGC	AACCAGAGAT	GCGCCTACTT	CGCTGCTGGC	GTCAGACATC
34561	GCTTTAATTG	AAGGGTATCG	ATAAACATTT	TGAGACATAA	TTTCACTTCC	GGCCCCGTTA
34621	TATTCCGGGG	CCGGCTCCTG	ATATCAGTTA	GAATTGTCTT	GTTTTAATTG	ATGTTTATTC
34681	AGACGGCTAC	GAACCTGCTG	CGTGAACTCA	TTACTTCCGC	CACCTCACATC	ACGCGCGGTA
34741	TAACGCAGAT	GGAGGATAAT	ATCGCTCAGC	GACTCCAGCA	GCTGATCCTG	ATCGGAACCG
34801	AATTCCAAC	TCCACTGTGA	AATGGCGCCT	GTCCCTTCAA	AAGGCAGGAA	AAGTTCATCA
34861	TCAAAATTGA	GCCTGAACAT	GCCGCTGTCT	TCCATGGCCG	TTGAAATCAC	CACACCTTGA
34921	TTAGCTTGTA	CGTTCAGCAA	AACGTTTTTCG	GTTTTGGTGT	ATTCCAAGGG	GTTAAGCAAA
34981	TAATCGATAG	TTTTTAAGTC	AGCAGTACTG	TAAAGCGTAT	TGCTGAGTTG	TACCACTGAA
35041	GCCCGTACAT	CTTCATAAGG	CCCCAGCAAT	GCGGGCAATG	ACAGCGCTAC	GGTTTTTTATA
35101	CGCCGATCAG	CGTGGGTCGG	ATAATCGCGC	AAGAACATTT	CGGCGCTCAG	TAAGAAAGTG
35161	AATGAACCCG	TACTCTTGCC	AATTTCCCAAC	TGTGATGATG	TCAGTAATGA	TTTTTACCGAT
35221	ATGGTTTTTA	TGATCTCCAG	ACGTCGTGGT	TTATGTTGCA	AATACGCTG	ATCCATCCGT
35281	TGTAAGGCTA	ATTTCAAGATG	TTCTCCGACC	AGCAGCCCC	GATAAGATC	ATTTCCAGAGA
35341	CCACTTTGGA	CGAAATTCAT	ATCATACTGA	CCTGTTTCGT	ACTGCCAGGA	GGCTTCGGCC
35401	AGTAAACAGA	GGGAATTAAC	CGCATCATAG	GCTTGCAAGT	AAAGCCGGAG	ATTTGGCTGA
35461	TCATCCACAT	GTATAACGCA	TCATTGGTAN	ANTTGTTCNN	NNNNNNNNNN	NNNNNNNNNN
35521	CCGAAGCATA	CCGCCAAGAC	CATCCCCCGC	ACGGCCAGAC	CGAAATATT	GGGAACCAT
35581	TCCGCCACAG	CGGCCGCGAT	GGCGGCTGAC	TGGGCAGCGA	TCACACCTTC	AGCCGCTCTT
35641	GATTGTAATG	CGATAACTTC	CTGCTCGGTG	ATGGAGATGT	TTTCATCATA	GAGCGATTTA
35701	TAGTGTGCT	GGCGCTCCTG	AGCGGCCCGT	CGGCTGATGG	TCAGTGCATC	CAATGAAGCC
35761	TGTTGCATGT	CAATCGCTTG	CTGTTGCAGA	TTGCGGGTAA	AGCTGTACAG	CCCCAGTTGC
35821	TGCTGCATAC	GGAAAGTGTT	AAAATCGGTA	TTGCTTTTTT	TCTCCAGCAA	ACTCAGTAAC
35881	GTGCTGCCGT	ACTGAATCAG	CGTTTCTGCG	GCCTCTTTTG	CCCCGCTCAT	GATCGGGGTG
35941	AAACGATAAT	TCGGGATTGC	CCGGCGTTTT	ATGCCCGCCA	TACGATTAGC	CACAACACGC
36001	TGGTAACGCT	GCCTGAGCAG	ATCTTGCGGG	CTGATGGGTT	CATCGTATAA	TCCGGCCGGA
36061	AACCTTTTAC	CATCCAAGGT	CAGGTTATGA	CGTAAGTTAT	ATAGACGCTG	ATCCAACATT
36121	TGCCACAGTT	TGAGATATTC	CGTATCAACA	GGTTTGACAA	ATAAATCAGA	CGGTGCGGCA
36181	GAGACGGATG	TATCATATGT	CACAGGCAGA	AGTGGCACGT	TGCTGACAGT	AAGCATTAAAC
36241	TCCGTGCCCC	GTGCTTCACT	GTTTTTCATAC	AGAGCCACAT	CTTGCAAGCT	ACGGGGTTGC
36301	CAGTTTGCCG	CGAGCAGAAT	ATCAGGGCTG	GTACCCAGTA	ACATATTGAC	GGAGTCATAG
36361	ATCTGCTTGG	CGACAGTACG	TGCACTGGAT	GTCAGCTTAC	GGTATTCCAT	GTCTCCCTGA
36421	TCTAACAGAT	TCTTGACATA	GAACCGGAAT	ATTGCTTTCC	GGTAGTGAAT	GGGTTCACTG
36481	GCTGCAATGG	CATCCGATC	GGTTGGTTCA	ATTAACATCC	GTTACAGCGT	GGGTGGAGGA
36541	TCAATAATTG	GCCGTGAATT	CCAGTAACGC	GGTTTACCTT	GGTTGCTGGC	CTGAACAAGT
36601	TCATCTTCCA	GCGGATTAAA	AATATAGTGC	AGCCATTCCG	TGGCCTCTTT	TAATCGTTGT
36661	TCTATATTCA	GTCGCCACGC	GACCAGAAAT	GGCATATGGA	AAAACAGTTC	CCAGAAATAG
36721	ATCCCATTTG	CGCCATTTAA	ATCAATCGGC	GTAGGGGAATG	AACCGGGTAT	AGGCTGTTCC
36781	GTATAAGCT	GTGTATTCCA	GTCAGTACC	TGCGGGATAC	CCTGACTGGC	AATGGCGATC
36841	AGTTTTTTTG	CAACAGTGT	ATTAAGGCGA	ATGTTTTGTG	GCGCGTTATC	AGTTTCATCT
36901	GCGGGGAAGG	AAAGGAATTG	CACCTGATCC	TGTTTATTGA	GTTTAATCAG	TTCGCGAATA
36961	TGCATACCGA	TTCTGAACTC	TTGAGTACAG	CTGGCACTTT	CATTGCCAAC	ACCACCTTTG
37021	GGCTTAAAGA	GAAGTTCGGC	TTTCAGGGTG	ATTCGATTAT	CCGACCCACG	CTTGATTGAT
37081	GGATAGGTTA	AATCAAGAAC	TTTTTCGCTC	AGTACCAGTG	GTTGTTTCATC	CAAGACAGTA
37141	TTATCGTGCA	TCAGCCGGAA	AGAACCCTTG	TAATATTGAT	GATCTTCTAT	CGCACCAAAC
37201	TTAAAGTCAG	ATTGAGCGAC	AATCTCCAGT	GTGTATCAG	TGCCATGAAC	AAAATTGACA
37261	ATCAGTTTGA	TACTGTCTTT	GCCGAAATCA	GGGTTTCAATC	CGGTTTGGAT	TCTCCGGCAA
37321	TAGGAAAGCG	TTCTTCCCGG	GTTGCCGGAT	AGAGCACCAT	AGTACGGTAA	TCGATAGGAT
37381	TGCCCTTAAG	CATCCTTGTC	TTACAGTGAG	TAATACCAGA	CCAGGTTGCC	GACATATTTT
37441	CCTTTTCGTC	CATCAGCATA	TTGGTCACTC	GGCAAATCAG	TAATTTCTAC	CAGCAGTGTA
37501	TCGCAGACAT	AACCGAAGGC	TTCTGCATAA	TCATAATCCT	TACCTTTCTT	ATCTGTCCCC
37561	TGAAGACGGA	CAAACGGAAC	CAGAGCCAGA	AACGGGTTAT	GCGGGTCTTG	CTGTATATCC
37621	ATCACAGCAA	CCATCTGGGC	CATCCGGTAT	TGCAGATGTC	TTCCGCGAGA	ATGGTGGGTG
37681	TACTCCAGCT	GCCATCATAT	TTGGCATAAG	CGATTTTGAT	CCGGTCAGGA	ACGGTGTGGG
37741	AGGAACCCAA	TCACCCGCAT	TAGGTCAAAC	GTTTTGGTTA	TGCAGTGATA	ACGCGTGTGT
37801	ATCTTTAGTT	TCAGACTGTT	CTTCAACTTC	CGTCCAGGCA	ATATACAGGC	GATTATTGAG
37861	GAAAATGGGG	CGTATCAAAT	TGGGGTCTAC	GCTGCCCAAT	GGCAGGTCAA	TAGGTTTCCA
37921	CTCGCTCCAG	GCATTGGGAG	ATAACGCATC	GGTATCAGGA	TGGCGTATCG	AAAGATTGAG
37981	TGAACGCCAG	TAATATTGGT	ATGGCTGTGT	ACGGGTACGT	CCGACAAAGA	AGAATTATC
38041	GCGTTTGATG	TTAACACCAT	CTTCATAACC	TGCGATAACT	TTCAGGTTAC	TGACATCTTC

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Fig.2.

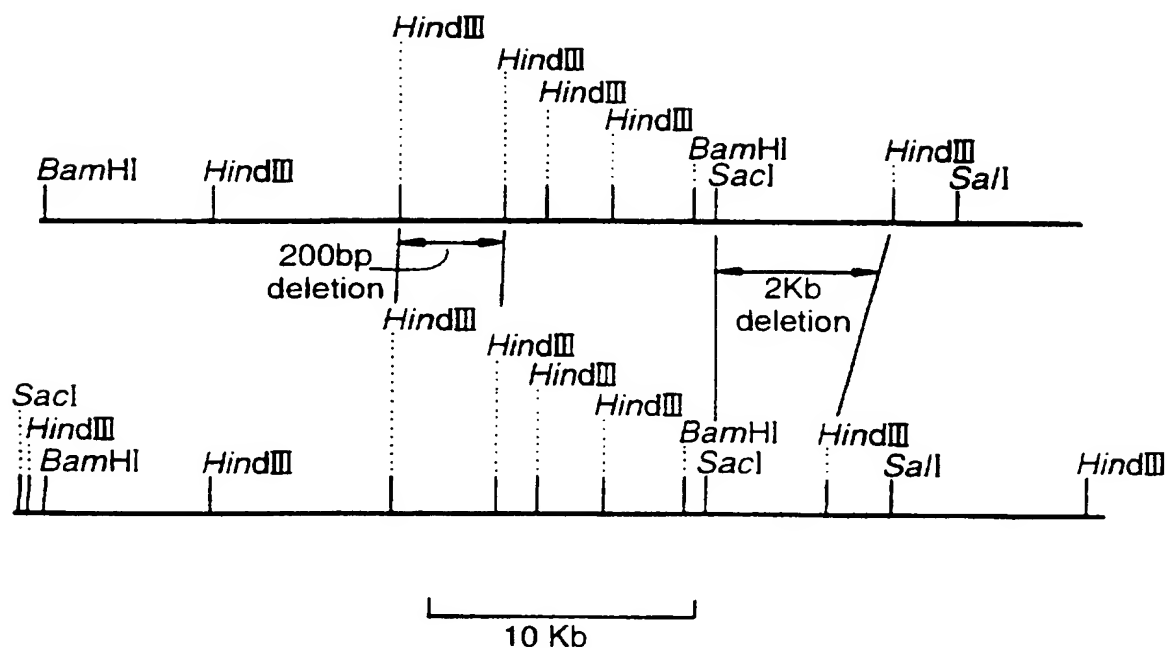
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38101 AAAATTATTC AGATAACCGA GCACCGCTTG TTGTACAGAA TCTTCGGTAA TTTTCCCTG
38161 ATTAAGGGCA CTTTCCAGTT GGAAGAAGAA TTCTGTTTTA TTCAGGCGTA ACAGGGGTTT
38221 CAGATAGCTT TCCGGATAAG TCCGTAATAA GCGATCCC

```

N=unspecified base

Fig.3.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/02284

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A01N63/02 A01N63/00 C12N1/20 C07K14/24 //(A01N63/02,
63:02,63:00),(A01N63/00,63:00)

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A01N C12N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 00647 A (COMMW SCIENT IND RES ORG ;SMIGIELSKI ADAM JOSEPH (AU); AKHURST RAY) 5 January 1995 cited in the application	1,5,11, 13, 18-21, 24-26, 29,30,32
Y	see page 1, line 3 - line 29; claims 10-13	3,4, 6-10,12, 14,27, 28,31

	-/--	

☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

17 December 1997

Date of mailing of the international search report

14/01/1998

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Muellners, W

INTERNATIONAL SEARCH REPORT

national Application No

PCT/C /02284

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>CHEMICAL ABSTRACTS, vol. 118, no. 1, 4 January 1993 Columbus, Ohio, US; abstract no. 3550, YAMANAKA, SATOSHI ET AL: "Biochemical and physiological characteristics of Xenorhabdus species, symbiotically associated with entomopathogenic nematodes including Steinernema kushidai and their pathogenicity against Spodoptera litura (Lepidoptera: Noctuidae)" XP002048914 see abstract & ARCH. MICROBIOL. (1992), 158(6), 387-93 CODEN: AMICW;ISSN: 0302-8933, 1992,</p> <p>---</p>	3,6
Y	<p>DATABASE DISSABS STN-International / UMI Company STN-AN 96:33246, DISSABS order no. AAI9608671 , 1995 DAVID JOSEPH BOWEN : "Characterization of a High Molecular Weight Insecticidal Protein Complex Produced by the Entomopathogenic Bacterium Photorhabdus luminescens (Nematodes, Biological Control)" XP002048915 see abstract & DISSERTATION ABSTRACTS JOURNAL INTERNATIONAL , vol. 57, no. 18, 1995, page 93</p> <p>---</p>	4,12,14
Y	<p>EP 0 238 441 A (CIBA GEIGY AG) 23 September 1987 see page 1 - page 2 see page 4, paragraph 3 - page 5, paragraph 2; claims 10,12,22,36,37</p> <p>---</p>	7-10,27, 28,31
X	<p>WO 84 01775 A (COMMW SCIENT IND RES ORG ;BIOTECH AUSTRALIA PTY LTD (AU)) 10 May 1984 cited in the application see page 1 - page 3, line 10 see page 4, line 24 - line 28 see page 4, line 36 - page 5, line 3 see page 14, line 17 - line 29 see claims 26,27</p> <p>---</p> <p>-/--</p>	1,4,5, 11,13

INTERNATIONAL SEARCH REPORT

national Application No

PCT/GB 97/02284

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	H.MATSUI ET AL. : "Nucleotide sequences of genes encoding 32 kDa and 70 kDa polypeptides in mba region of the virulence plasmid, pKDSC50, of Salmonella choleraesuis " NUCLEIC ACIDS RESEARCH , vol. 18, no. 8, 1990, pages 2181-2, XP002050055 see the whole document ---	21-25
X	F.BINDER ET AL. : "Cyclodextrin-glycosyltransferase from Klebsiella pneumoniae M5a1: cloning nucleotide sequence and expression" GENE, vol. 47, 1986, pages 269-77, XP002050056 see page 269, the summary see page 270, right-hand column, last paragraph - page 271, right-hand column, paragraph 1 see fig. 3 bp 2641-2809 ---	21-25
P.X	US 5 616 318 A (DUDNEY RALPH A) 1 April 1997 see column 1, line 65 - column 2, line 52 see column 5, line 3 - line 4 ---	1,4-6, 11,13
T	WO 97 17432 A (WISCONSIN ALUMNI RES FOUND) 15 May 1997 see page 2, line 31 - page 3, line 23 see page 5, line 1 - line 16 see page 8, line 23 - line 33 see page 9, line 41 - page 11, line 14 see page 17, line 1 - line 21 -----	1-32

INTERNATIONAL SEARCH REPORT

national Application No
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EP 0238441 A	23-09-87	GB 2188049 A AU 608508 B AU 6999287 A BG 46006 A BG 46752 A BR 8701162 A DE 3788077 D DK 128687 A EG 18869 A ES 2059404 T IE 59456 B JP 62224295 A	23-09-87 11-04-91 17-09-87 15-09-89 15-02-90 12-01-88 16-12-93 16-09-87 28-02-94 16-11-94 23-02-94 02-10-87
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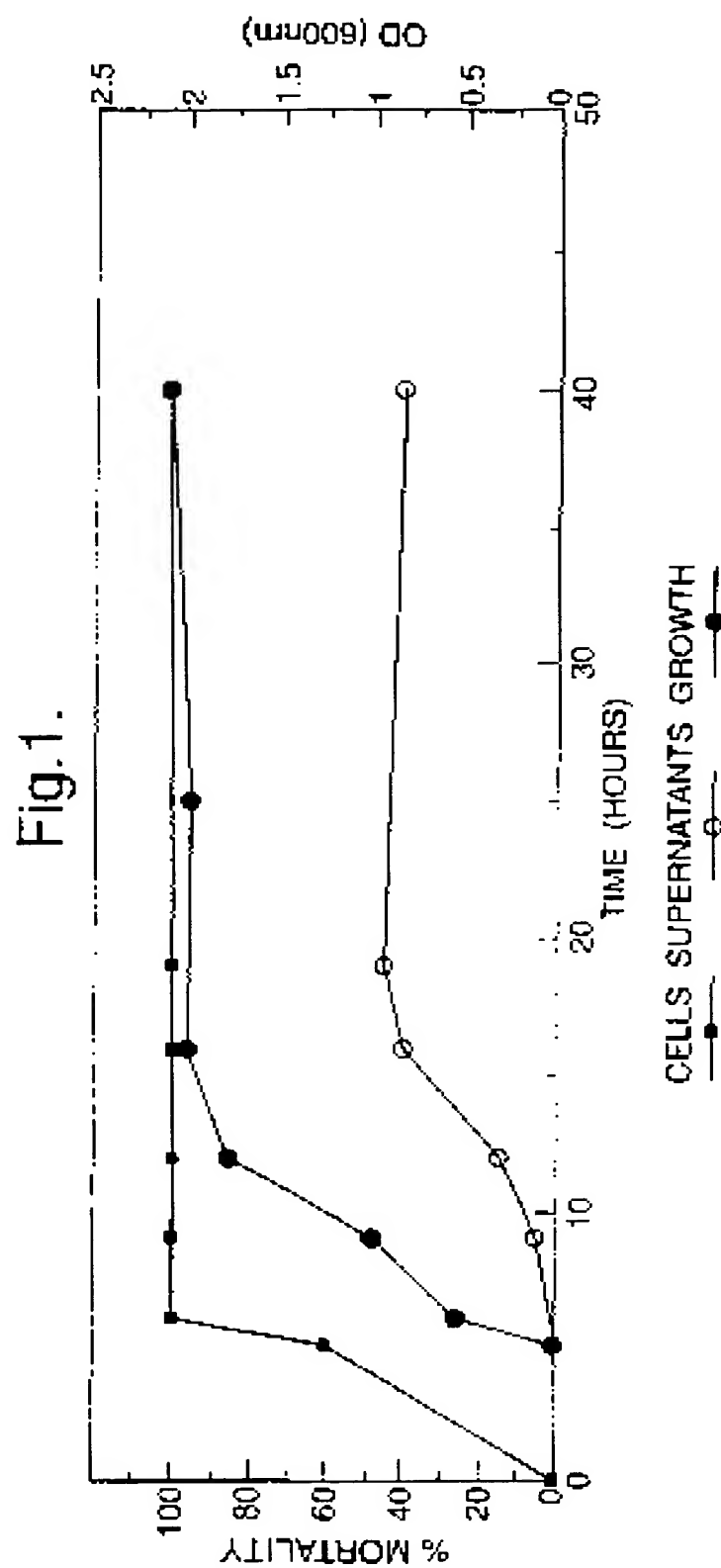
(51) International Patent Classification ⁶ : A01N 63/02, 63/00, C12N 1/20, C07K 14/24 // (A01N 63/02, 63:02, 63:00) (A01N 63/00, 63:00)	A1	(11) International Publication Number: WO 98/08388 (43) International Publication Date: 5-March 1998 (05.03.98)
(21) International Application Number: PCT/GB97/02284 (22) International Filing Date: 27 August 1997 (27.08.97) (30) Priority Data: 9618083.1 29 August 1996 (29.08.96) GB (71) Applicant (for all designated States except US): THE MINISTER OF AGRICULTURE FISHERIES & FOOD IN HER BRITANNIC MAJESTY'S GOVERNMENT OF THE UNITED KINGDOM OF GREAT BRITAIN & NORTHERN IRELAND [GB/GB]; Whitehall Place, London SW1A 2HH (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): JARRETT, Paul [GB/GB]; 14 Home Furlong, Wellesbourne, Warwickshire CV35 9TW (GB). ELLIS, Deborah, June [GB/GB]; 7 Cooke Close, Warwick, Warwickshire CV34 5YG (GB). MORGAN, James, Alun, Wynne [GB/GB]; Pen-Y-Goruf Farm, Gorof Road, Ystradgynlais, Swansea SA9 1TP (GB). (74) Agent: SKELTON, S., R.; D/IPR, Formalities Section (Procurement Executive), Poplar 2, MOD Abbey Wood #19, P.O. Box 702, Bristol BS12 7DU (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: PESTICIDAL AGENTS (57) Abstract A method for killing pests (e.g. insects) comprising administering material from <i>Xenorhabdus</i> species (e.g. <i>X. nematophilus</i>) such as cells or supernatants orally to the pests, either alone or in conjunction with <i>Bacillus thuringiensis</i> or pesticidal materials derived therefrom. Also disclosed is an isolated pesticidal agent (and compositions comprising the same) characterised in that it is obtainable from cultures of <i>X. nematophilus</i> or mutants thereof, has oral pesticidal activity against <i>Pieris brassicae</i> , <i>Pieris rapae</i> and <i>Plutella xylostella</i> , is substantially heat stable to 55 °C, is proteinaceous, acts synergistically with <i>B. thuringiensis</i> cells as an oral pesticide and is substantially resistant to proteolysis by trypsin and proteinase K. DNA encoding pesticidal activity is also disclosed.		

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CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

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Fig.2.

2	TCCACAATTG	CCGGAGAAAA	TCAGTCGGGA	ACTGCCGGTG	ATTATTGCTC	ACTTATTAAA
61	CGAATTTGCC	GACCAGAAAT	AGGCTAAAAA	ACTGCTACAG	GGCGAACGCG	ACTCGAACCG
121	AGCCTTAACG	GTAAGAGATC	ATTCGGATCC	GCTGTATGCG	TTTTGTGGTT	ATCTGGTGTG
181	TGTCAATGAT	ATGACCGGAA	TGAAGATGGG	CAATAAAAC	ATTAGGCCAC	GAGCACCGAG
241	ATTGTACTTG	TATCATGCTT	ATCTCTCTTT	TATGGAAGCG	CACGGCTTTG	AACGTCCGTT
301	AACRGTGACT	AAGTTTGGTG	AATCCATCCC	CAAGATTATG	CTGGAATACC	GGGAGGAGTA
361	TCGAAAAGTG	CGAACCAAGA	AAGGCTATTG	CTATAACGTG	GAATTATCGG	AAGAGGCCGA
421	AGAATGGCTA	CCGTCACTGC	CTGAGTGTGG	AGACTTTTAA	TCACCTGTAT	AAAACCTTGA
481	GCTTTAAGTC	TGCACTCCAT	ACACAACCTA	AAATATCTAA	TTGTATTTAA	AAGAAAATAA
541	TAGATGTATA	GTATTTTTTT	AATATACAT	AAGCTCTACA	TGCTCTTCAT	TGGTGTAAAA
601	AATGGGTGAA	CAGGTGATAC	AGTCAGTGAA	TATCATATTA	ATTACCGTAA	ACCCAGATGT
661	AGCAAGGCTT	TCAGGGAAAT	GTGCAGAGCG	TGCATAACTG	AGAGGGGTGA	AAAGATTTTC
721	AGGGGGGCTT	ATGGCAGGTA	AACAAATCA	GAAGCAATA	CCGTGCACAA	TCTGGTTTTT
781	ATTTTTTGGT	ACTACCTCAA	ATTAAATGA	TGTAATCATC	TGATTTTAT	TAAGAAATAGA
841	AGTTAATCAC	AATTTCAATG	ATGGACTTTT	ATTACACATG	GTATAGATAA	ATAATTCTGT
901	TATATCTGTG	TTCAATTACG	ATTCATCAGG	AGTGTCTTTA	CAGGAGACAA	GAATGTACAA
961	CATCATTTAC	TTGTGGTTAA	AGGCGAAGAA	GCAGGCTTTA	ATTTCAAGGG	GTTCGTTCAAC
1021	GCCTGAATCA	ATTGGAAATC	GCTATCAAAA	AGGACGTTGA	GATCAAAATC	AGGTATTGAG
1081	CTCTAATCAT	TCGATGAGCC	GTGACCGAGAA	TGTTAATCAT	CAAGCCCTCA	GFTTTGTGAA
1141	ACCCATTGAT	AAATCCTCTC	CCCTGTTTGC	TGGATGCCAG	TTTTGTGCAAT	TACAGGACAA
1201	GCCAGATGGG	ACRACCTGGG	TTCTTTTATG	AAATCAACCT	GACCAAGTGC	ACGATTGTGG
1261	ATATTTCTTA	TAATTTATCCG	GCATTCAATC	AATCATATG	GTGCGATACC	CCATGAAGTG
1321	GTGATGCTCG	ATTATAGTGC	CATTTTATGC	AACTCATGCG	CCGCAAGACT	TGGGGTACAA
1381	GCATAAGCAA	TGAGCCCGAA	GTGACGAGGC	AGGCGGCTTT	TATCTGGGGT	CTCGAATGTT
1441	AAGCCACTTA	AGAAGCCGCT	GCTTGAAGAA	ACCCCGGTAA	AACCCGCTAA	ACATCATGCT
1501	CGTTATCGTT	GTGTGGATGA	TGACCGCAAT	CTTTAACCAG	AACGCAAGTA	TGGGGTTTTG
1561	CTGCCGGATG	GTCCAGATAA	AGAGGGAAAG	ACTGATAAAC	AAGGTTACAC	CCAATGGCAT
1621	CTTAAGGATG	ACAAATATAA	ACTTGAATTT	CAATTTTTTA	AGGATTAATA	CCATGCCAGC
1681	CTATACCGTT	CAGACAAATA	TAGAAATCAA	CGTACTCTGT	GAATAACCTG	TTTACGACTT
1741	AACCTTTTAT	CGTAAAGGATG	CAAAAGGAAA	TTTTCATATC	TTGCTTGATG	TTTTTTCAGGA
1801	GAACTACAG	AGTAATTATG	AAACACAAAC	GCATATCAAC	CAGGAAATAG	ACGACGATCT
1861	TTCTGTGATT	TATATTTATG	AAATTTATGCT	TCACCGCAAA	CATGGCTCAA	ATATATTTCC
1921	GGCATGCAAA	ACCCATTTTA	AGAAATGTA	TACCTTGGCT	GAATTAACCT	CCCGTAAGGC
1981	CTGTTCCGAG	AAAAAAGCGG	AAATGCTCTG	TATTTTGAAG	AGTACAGTTG	AAGCAAAACC
2041	TGTCAGCGAC	GGGGATAATA	CCGTTGACTT	AAATATCACT	ATTCTGTGAC	GACCTTTTTAT
2101	TGCCAAAGAA	TATCCCATTT	GTCAACCAAC	CGATCCATTT	GAAAAAAGTA	AAATTGAATC
2161	ATAAATACAG	GACAGTTTAT	CGAAAGAAAT	TTATCCGGAT	CAAAATGGAG	CAGTTTATG
2221	TCAGGGCGCG	AGCACACTAT	TTTAGCTGCG	TTTTTAAGAT	GATTATCTCT	TATTTTTCAG
2281	TTTTAATAGT	GTTTTATATG	AGTGAATTTT	AACTGACAG	GCATTTCTTT	AGACTTTTAT
2341	AGAAAACTAA	AGAAATTAAAG	AACAGATTCG	ACATTTTAAG	TTCAATATTT	AATCAAGGTA
2401	TGCTCGCGCC	CTGAGTTTAT	GTGCGCTTGC	CTCTTTTCTT	TATTGCGCTG	CAATAGATAG
2461	ACCAGATATT	TATGAGCAAG	CGGCACGAGA	ATTATGCGAA	TATGGCCGAA	CTAAATTTGG
2521	TCAACTGGAA	ATTAAGCCGG	GTGAGCGTTG	CCGACATCTT	AAAGGTACTT	TTTATATCA
2581	ATATGGTGAA	AGAATATCTG	GCTTAGATTT	CTGACATTG	GCAAGCTTAA	GAGATTCAAG
2641	AAATATGATG	ATGAGGTTGA	TGATGAAGTA	GCTGGTATTA	CAATGTGGGG	AAAATTGACA
2701	GAATGGTTTT	AAAAATCAGG	GTATGAATAA	GTATTTAGTA	ATGTCGGCTT	ATCCCATTTCT
2761	AATATAATAG	ACATAGTAAAC	TCTTAGTGAT	TACTATAACA	AAGGATATCA	TGTTGTTACT
2821	TTGATTTTCA	CAGGAATGTT	ATCAGATTTT	CGTGACATAG	AAACATCAGG	AAAAATCAT
2881	TGATAGTTT	GCGAAGGAGT	AGTAGAAAC	TATGAGAAAG	AAATATCAC	AAATATTTCA
2941	GATCTGAATC	AATATGTAAA	TTTAATCTCG	TTTTCATGGG	GTAAAGTGGG	ACATCAATTT
3001	AAAAAAACA	AATCACTAGA	TTATGTACTC	AACCATATTT	TTTGAAGGTT	GGTTTTTAAA
3061	CCATGAAAT	AACATGAAA	AAATATTAAT	TATTTTATTT	TTTTTACTTT	ATGGTTGGGG
3121	TAATCCAAAG	CCAAAAGTTT	TACCAAAATC	AGAGTTTCTT	CCTGATGCA	TGATAAATGA
3181	ACCATATCAG	GCATCAATTA	CCATCACAGG	AGGTGCTTTG	AAATGAAAAA	CGTTTTGGGT
3241	AAAAATTCAT	CCTACTGGGT	CAGGACTAAC	ATGGAATCCA	AAAGATAGTT	CTTTCTTATA
3301	GGGTGAAAA	AAAGAAATTA	GAAGAGTTTA	TCATCATATA	AATATAACAG	GTACCCCAAA
3361	GAAGACAGAA	TTGATAAATA	TTGAAGTGGT	AGGATTTTAC	TTGGGTACAA	TGTACGCCAG
3421	GAAGAGTTTC	ACTATAAATT	ATACTATATA	ACTAAGGGAA	TAAATGTTCAC	TATCAGATTC
3481	GTGATTTAAT	TGCGCATTTT	TATACTTTTG	TATACTCTCT	CAACATAATC	AGGATTTCTT

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Fig.2.

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3541	CTTATTATTT	TTCATGGTGC	TAAAAACGTT	TATTGCAAAA	ATAAATTAAAG	TTAATCAOAT
3601	AAATTATCTG	CATTACTUFT	ATAATCGATA	ACACGATAAC	CTGACTTTCT	GCCTGTTCTT
3661	ATGAATCEGA	AGATAATCCT	TTCTGAGCCT	GAACGAATCA	CATTGCAACC	ACTCGCTTTG
3721	AATCACCCAC	ACCGGGACAT	TGTAACGCGA	GGAAACGGCT	TACTCATGCT	TGCCAGAGGG
3781	AGCAAGCCGT	CCCAGATCAC	CGTGAATATC	GGATGCAGTC	TCCGGGTTAT	CTGTAAATTCG
3841	GTTCAATGT	GGCAGAGATA	GGCGGATTAT	TGGGCGETCA	TGCCCGAGGC	CGGTATCTCG
3901	CCATGACGCC	TGACATGATT	GGCACTGCGC	TGGAAGCCGC	CABGCGAGAG	TCCCTGACGT
3961	GCGTGAAGC	CAGGCAGGGT	TTCCCTGCGT	TGTACGCTTG	AAACGCTGGC	GAATACCTTG
4021	AAAAAACAGG	GGCTCCCTTA	TAAAACGCCC	CGCCTGTCCG	TTAAAAAAG	CGCAATAAAA
4081	CGGAGTTTGC	TGAAAAATCC	GCCTTGCTGA	ATAAAATTAA	GGCCCGAGCA	CAGTCAGGAC
4141	ATTACCGTCT	GGTCTATTTT	GAGTTCGTGG	GGCGTTAAAT	TACACGGATA	ACACGCTGTT
4201	TTACCGAGCA	ACGTCAGGCA	GTATCAACGG	AGATGAAGTG	ATTGATTTT	TAGAGCCGGT
4261	GGCCAGACAA	GGGACAAACG	CCTGACATTT	TTAGTGTGGG	ATAATGCCCG	TATCCATCAC
4321	GGGATAGAGG	AAAAAATCAG	AAATGGCGGG	TGACGAGAAC	ACAACTGTGT	TTTATTTCTAT
4381	CTTCCCGCTT	ACAGCCCGAG	GLTGTATCTG	ATTGAAATCG	TCTGGAACA	GGCCAAATAC
4441	GACTGGCGAC	GTTTTATCAC	CTGGACTCAG	GATACAATGG	AAATGAGGT	AAATACTTTA
4501	TTGAAAGGTT	ATGGCGACCA	ATTTGCAATT	AACTTTTCTT	GAGTACTTAG	TARGAATAGA
4561	GTCAGTCGAG	GTTTTTTCAT	TTCCGGTCTG	GGGGATGATA	CTGAAATTT	GTTTGTAAATC
4621	TCTCAAAAAT	GCTGTTTCTG	TGGCTACGTC	TGTCTTTTGG	GATATTGTTT	CCATCAAGTC
4681	TGTCAACATA	CTGTTAAGTT	AGATGTTGAT	AAAAGAGACT	GAATTATAAT	ACAAAACAAT
4741	AAATCACTTG	GACATATTTT	TATTTCACTT	GAGACATTA	GGTTGATTTT	CCCAATCTGG
4801	TCAGTTATAA	CCGAATAAGG	ATCTTGAAAA	ATCATGGGAT	CTTACTTTTA	TCAAAATGAAG
4861	TTAACGTA	AATTGATAAA	GAAATCTATT	TAATTCCTAG	TGCCGTTGGC	ATAAATATTT
4921	TGTGTTTTGT	TAATGAATGA	ATAACCGGCT	ARGCTGGATT	TTCATTTTTT	AATTAAGCTG
4981	TACATATATG	TATTTATTTA	TATAAAGAGT	TTGTGCCCAT	TTAACCAGTA	AACAAATTTG
5041	TTCAACCGTA	ACTTAGCTTC	ATCGACTTTT	GGCCTCGCCT	GGTCAGAAATC	TAGGCGCCGT
5101	ATCCTATTTA	TTTATGATAA	ATAAATTTTA	ATTATCTTTA	ATAAGCTGAA	TATGTGGATT
5161	TGTGCTCAAT	CTTGGATTCA	AGTATGTATT	CCCTTTTGTA	CCCTGCTTTA	TTTFAAGGCA
5221	GATGAAGAGG	ATGCCAATAT	GACACAATAT	CGATTACGAC	TGTAACATTA	AAGTCAGTTA
5281	TAAATTTTTAT	GATTAATAATG	AAATTTTAGT	AGAAATTCGT	ATTCTATTCC	GCCATTTACA
5341	ATAGCATCCT	CTTTAATATC	ATTAATCTCA	GATAAACAA	ATAATTACAA	TGTGAATAGA
5401	ATAATCACTT	ACAAATTAAG	CACTAAATCT	TCAGATGAAC	TCTTAACTTA	CAACACTATT
5461	TTATAAATA	ATTGAGGTTA	TTATGTATAG	CACCGCTSTA	TTACTCAATA	AAATCACTCC
5521	CACTCGCGAC	GGTCAGACGA	TGACTCTTGC	GGATCTGCAA	TATTTATCTT	TCAGTGAAGT
5581	GAGAAAAATC	TTTGATGACC	AGCTCAGTTG	GGGAGAGGCT	CGCCTCTCTT	ATCATGAAGC
5641	TATAGAGCAG	AAAAAAATA	ATGCTTGTCT	GGAGCGGGT	ATTTTACCTT	GTGCCAAGCC
5701	ACAAATATCC	GGTGTATCTC	GACTCGGTAT	TGAACGAGAC	AGCGTTTCA	GCACTTATGA
5761	TGAATGTTTT	GGTGCCGCTT	CTTCTGCTTT	TGTGAACCGG	GGTTCAAGTG	CTTCCATGTT
5821	TTCAACGGCT	GGTATCTCTA	CCGAATTGTA	TGCTGAAGCG	AAGGACTTAC	ATTTTTCAG
5881	CTCTGCTTAT	CATCTTGATA	ATGCGCGTCC	GGATCTGCGT	GATCTGACTC	TGAGCCAGAG
5941	TAATATGGAT	ACAGAAATTT	CCACCTCTGAC	ACTGTCTAAC	GAACCTGTTG	TGGAGCTATT
6001	ACCCGCAAGA	CCGGAGGTGA	TTCCGACGCA	TTGATGGAGA	GCCTGTCAAC	TTACCGTCAG
6061	GCCATTGATA	CCCTTACCA	TCAGCCTTAC	GAGACTATCC	GTGAGGTGAT	TATGAGCCAT
6121	GACAGTACAC	TTTCAGCGCT	GTCCCGTAAT	CCTGAGGTGA	TGGGSCAGGC	GGAGAGGGCT
6181	TCATTACTGG	CGATTCTGGC	CAATATTTCT	CCAGAACTGT	ATAACATTTT	GACCGAAGAG
6241	ATTACGGAAA	AGAACGCTGA	TGCTTTATTT	GGGCAAAACT	TCAGTGAATA	TATCAAGCCC
6301	GAAAATTTCC	CGTCACAATC	ATGGATAGCC	AAGTATTATG	GTCTTGAAC	TTCTGAGGTC
6361	CAAAAATACC	TCCGGATGTT	GCAGAAATGG	TATTTCTGAC	GCACCTCTGC	TTATGTGGAT
6421	AATATCTCAA	CGGTTTAGT	GGTCAATAAT	GAAAGTAAAC	TGAAAGCTTA	CAAAATAACA
6481	CGTGTAATAA	CAGATGATTA	TGATAAACAT	GTAATTTACT	TTGATCTGAT	GTATGAAGGA
6541	AATAATCAAT	TCCTTATATG	TGCTAATTTT	AAGATATCGA	GAGAAATTTG	GGCGACTCTT
6601	AGGAAAAACT	CAGGACAAAG	TGGCATTTGT	GGCAGCTTTT	CCGGTCCCTT	GGTAGCCCAAT
6661	ACTAATTTCA	AAAGCAATTA	CTTAAGTAAC	ATATCTGATA	ATGATACAG	AAATGGCGTA
6721	AAAATATATG	CCATATCGTA	TACGTCTTCC	ACCAGCGCCA	CAATTCAGGG	CGGCGCAATA
6781	TTCACTTTTG	AGTCTTTTCC	CCTGACTATA	TTTGGGCTCA	AACTGAATAA	AGCCATTTCG
6841	TTGTGCTTGA	CTAGCGGGCT	TTCACTGAAAT	GAACTGCATA	CTATCGTACG	CAGTGACAAAT
6901	GCACAAAGCA	TCATCAACGA	CTCCGTTCTG	ACCAAAATTT	TCTATACTCT	GTCTACAGT
6961	CACCGTTATG	CAGTGAGCTT	TGATGATGCA	CAGGTACTGA	ACGGATCGGT	CATTAATCAA
7021	TATGCUUGAC	GATGACAGTG	TCAGTCATTT	TAACGCTCTC	TTTAATACCC	CGCCGCTGAA
7081	AGGGAATAATC	TTTGAAGCCG	ACGGCAACAC	GGTCAGCAAT	GATCCGAGTG	AAGAAACAATC
7141	TACCTTTTGGC	OGTTCAAGCC	TGATGCGTGG	TCTGGGGATC	AACAGTGGTG	AACTGTATCA
7201	GTTAGGCAAA	CTGGCGGGTG	TATTGSAACAC	ACAAAATATC	CTCACTCTTT	CTGTCCCTGT
7261	TATATCTTCA	CTGTATCGCC	TCACGTTACT	GGCCCGTGCC	CATCAGCTGA	CGGTTAATGA
7321	ACTGTGTATG	CTTTATGGTT	TTTGGCGGTT	CAATGGCAAA	ACAACGGCTT	CTTTGTCTTC

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Fig.2.

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7381 CGGGGAGTTG TCACGGCTGG TTATCTGGTT GTATCAGGTG ACGCAGTGGC TGA CTGAGGG
7441 CGGAAATCAC CACTGAAGCG ATCTGGTTAT TATGTADGEC AGAGTTTCAGC CGGAATATTT
7501 CACCGGAAAT CAGTAATCTE CTTAATACTC TCCGACCTCC TATTAGTGAA GACATGGCAC
7561 AAAGTAGTGA CCGGGAGCTT CAGGCTGAAA TCCTGGCGCC GTTTATTGCT GCAACGCTCC
7621 ATCTGGCCTC ACCAGATATG GCGCGGTATA TCTGTGTGTG GACTGATAAC CTGCGGCGCG
7681 GCGGCTGAA TATGCGCGGA TTTATGATGC TGGTCTGAA AGAGACCTCT GTTATCGCTT
7741 AAACGACCCA ACTGGTTCAA GAGCTTTCTG TCTGGTCAAT TTCOGATTTT GTGGTACTGG
7801 CACTGCGTCT CAGTGAAGCA GACAACACAA TATTGATACT CTGTTCTCAC TCTACOGATT
7861 GTGCGAGAAG CCRACCGCCG TGGGAAATCC CGGCTCTGAC ACGCTGGATA TGCTGCGCCA
7921 CCACCACTGG ATTAATGGGC CAGCTGGGCC TCCTGATGG GCGTGGACAT CAGTATGGTA
7981 AGCAGACACT CACGGGCGAC CCGGCGTGAA CCACTTCAG TGTGGGCAGG ATATCAACCC
8041 ACGGAGGCCA TGGGTTCCCG TGGCATCAGC GTGCTCACT GATGCGCTCG GTTATCGTA
8101 CCGTGTGCG TGGATACATG GTGACTGCAT TAAACAAGC CAGTGGAT CTGCTGCGCT
8161 CGCTGGTGAA TATCGGTTAC GCAGAAATA TGGCAGCGCG GTTGTGCAAT CTGCTGCGCT
8221 GGCATAAGTG GCAGACGCTG GCAGAGCGCC TGAGTAACTG GTTGTGCAAT CTGCTGCGCT
8281 AGACGCTGEC GGATTATACC GTGTCCCTGC ACAGCCGGGA TGACCTGTAC AGCTATTTCC
8341 CGAATATCCA GGCAGAAGGG TCTGCCATAA AAACCAACCC ACTGGCAGAG GCCATTGCTG
8401 TGATTGATAA TCAGGTCTCT CCGGCGCTGA ACGGATAGA GCTTAATGCC CCGTGGATG
8461 GTATTACGCT CTACATCAAC ACGGCTGGA CGGTGAATAA CCGTTACAGC ACCTGGCGCG
8521 TGTCAACCCG CCAGTTTTTT GCTGGTTTAT TATCCGAAA ATTACATTGA CCCGACCCAG
8581 GGGTGTGCG GCTGGTTTAT CTGCTGGGAG ATATCAGCCA GAGTCAGCTC AGCTGGGAC
8641 AGACCCGGAT GATGGATGAA ACTTACCTGA CCGCTTTGAA ACCGTGGCAG
8701 CGCTGGAAGA GGCCTTTAAA ACGTCACTGA CAACACCGGA CTGACCTGGT CATATATCA
8761 TGTCAGCGCT ATACCGACA AATATTACTG GCGTAACTG ATTGATACAG
8821 AACGCGGGAG AACCTGCGG CCGTGAAGA TGGACGAAG ATTGATACAG
8881 GCGTGAAC TGCGCGGATG CCGTCAATAT CAGGGAACGT TTGCACCTTA
8941 ATACAAGGAT GCAATACCTC CCGTCAATAT ATCDGGTGA AACCTATGAC
9001 AAAAGAGGA AGTGGCGAAA AATGGTACTG GTTGGAGTGC CCGCTGGTCT TACGATATCA
9061 TGAACCTGGC GTTTCTGCGT CATGATGGCA AACCTGACAC TGAACCGCTG GCGGTGGCCG
9121 CAACGCAAGT GGAGGCGGTC GATACTCTGC TGGTGTGTTG GTACAAACC GCGGTGAGTT
9181 CATCAGGCTT TCAGGGCGAG AATAAAGATG TGGCAGGCTAT GACCAATTTAC GCGGATGGCT
9241 ACCCGGATTT TGGCGACAA ACAGCACTCA ACGTTACAGC CAAGTGAATA ATACCTTTGA
9301 CTTTCAAAA GATGGAGAAC ACGACTTGCT AAGAAAGGCC AGCTATCGTT TCGCGCAGGA
9361 TATCATTCAT ACTCAAGCA CCGTGGTGGT TGTGTCATC GGTGATGATA CTCTGAGCT
9421 TTTTGAAGTG CCGTGGTGGT CCGAGATAAC CAGTAAATAC TCCAGCGATA ACCTTGCTAT
9481 GATGGAAAAC GCGAATATTC TCAGTGTGAG ATATGATGGC AGTGGCAATG TCATCAGAAA
9542 TACGCTACAT AAGCGCGCTT AACTGACGGG GTTGGATGAA AGTCCCACTA CCGCAATGCA
9601 CAACCAATC AGCGCCATGA TAAACATTAT GCGGCTTACT CTGATCTGGG CTGATCTGGG
9661 TTTATCATCG CAAATACCGT AANACTATAT TGCATCAGTT CAAGGCCACT AATTATTATG
9721 ACCGTTTTTA TTAACCGGA TTCTAACACC AGTTGAAAT TTCACGTTTG AATAATTCTC
9781 AGATTACACT AGGCGTTTGA ACACATTTT GCAGTTATGC CATCCGCTG GCTGGATATT
9841 CGAGTTTCCA TTTTCTCCAA TACCTGTCAG TAAACCCAC TAAACCCAC ACCTTTACCG
9901 AACCGTGTAT TTTAAAAGT GCACTTATGC ACAGTTTGA TGGTATGCG TACACCTTTA
9961 GATATTTAGT TCTATCAAT CATCCGCTG CTTTACCAA TAATATTGCT TAATATTGCT
10021 TGATGTCAA ATTAAGGTG TASCCTGCG TAAACCCAC TAAACCCAC TACACCTTTA
10081 TATTGCTTCC TFGCGGCAA ACAGTTTGA TGGTATGCG TAATATTGCT TAATATTGCT
10141 AATCGATGCT TCATCGTTGG CTTTACCAA TAATATTGCT TAATATTGCT TAATATTGCT
10201 GACCAAGCC AAGACCGGGC GAGTGTGCG TAAGATCAAG TCTGCGTGAA TCTGCGTGAA
10261 GGTAAATTAT AATCOGGAAG ATATTCTGTT TAATACCTG TAATACCTG TAATACCTG
10321 TATGCACTC GGGGTGTATC GTATTCTGTT TAATACCTG TAATACCTG TAATACCTG
10381 CAGAGCAAC ACGGCAATTG ATACTATCTT GACAATGGAA GACAATGGAA GACAATGGAA
10441 TCCCTTGGGA GAGGCTTCT TTGCCAATCT TGTCTGCTT TGTCTGCTT TGTCTGCTT
10501 TGGCATGAG CCGTGGTTTA AAATCCATAT TATCCGATAC TATCCGATAC TATCCGATAC
10561 GCTTTATTAC AGCGGAATGT TGCATGAAG TGCATGAAG TGCATGAAG TGCATGAAG
10621 TTATGCCGAA CGGTATTACA TGCATGAAG TGCATGAAG TGCATGAAG TGCATGAAG
10681 TACCTATGAC AACCTTGGG ATCTGCTTTT CTTTATTTTT AGGAATGACG
10741 TGTATTAAAT AACGATGCTG ATCATGATTC TTCTATCGCA TTCTATCGCA
10801 TATCAAGAA TACAAAGGAT TTTTGAATGT CCGTCTATTA CTGGGAATGT
10861 GGAATTCAT ASTGCCAGCG GGAAGAACAA TTCGAGAGG GAGAGAAATC
10921 TGCTTCCAGC GTTTGCTACA TATGGTAAAC TATGGTAAAC TATGGTAAAC TATGGTAAAC
10981 GCTATAATC CCGCGGCTA TATGGTAAAC TATGGTAAAC TATGGTAAAC TATGGTAAAC
11041 CCGCGGCTG AAGAGACACT CCTGGAATGC CCACTATATA CCACTATATA CCACTATATA
11101 CGTGGACAA TATGACCGA CCACTATATA CCACTATATA CCACTATATA CCACTATATA
11161 ACTATTCTG CCGCGGCTA TGGCTATCG CCACTATATA CCACTATATA CCACTATATA

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Fig.2.

11221	CAAGATGTGG	TATGTGGGTG	CTTTGGAAAT	GCTGGGTGAT	GAGCCGGAGG	ATTACGGCAG
11281	CCAACAGTGG	GCCGCACCGT	CTCTTTCCGT	GGCGGGCAAC	CACACTGTGC	AAGCCGGCTA
11341	TCAACAAGAC	CTTACGGGCG	TAGACAACGG	AGAAGGTTGC	ACTCAACCCG	GCAACGCTAA
11401	CTCGTTGGTG	GTTTGGTCCT	GTCGGAAATAT	AACCCGGAAT	CAACCGATTA	CTEGCAAACC
11461	TGCGTTTGGG	CCTGGTTAAC	CTGCGCCATA	ATCTTTCCAT	GAGCGGCAAC	CGTTATCCCT
11521	GGCGAATTAC	GGGAGCCCTAC	GATCCGAAAG	CGCTGCTCAC	CAGTATGGTA	CAGCCTTCTC
11581	AGGGCGGTAG	TGCAGTGTCT	CCCGGCACAT	TGTGGTTATA	CCCGCTTCCG	GTGATGCTGG
11641	AGCGGGCCCG	CAATCTGGTA	GCGCAATTAA	CCCGTTGGG	CACCTCTCTG	CTCAGTATGG
11701	CAGAGCATGA	TGATGCCGAT	GAATCACCAC	CGTTGCTACT	ACAGCAGGGT	ATGGAACCTGG
11761	CGACACAGAG	CATCCGTATT	CAGCAACGAA	CTGTCCGATGA	AGTGGATGCT	GATATTGCTG
11821	TATTGGCAGA	GAGCCGCCGC	AGTGCACAAA	ATCGTCTGGA	AAAATACCAG	CAGCTGTATG
11881	ACGAGGATAT	CAACCCACGA	GAACAGCGTG	CGATGTCACT	GTTTGATGCG	GCGCGAGTTC
11941	AGTCTCTGGC	CGGCGAGGCG	CTCTCACTAG	CAGAAAGGGT	GGCTGCTTTA	GTTCCAAACG
12001	TGTTCCGGTT	CGCTTGTGGC	GGCAGTCTGT	GGGGGGCAGC	ACTGCGTGCT	TCCGCCCTCC
12061	TGATGTCCGT	TCTTGGCACA	GCTTTCCCAAT	ATTCCGCAGA	CAAAATCAGC	CGTTGGGAAG
12121	CCTACCCGCC	CCGCCGTCAG	GAGTGGGAAA	TTCAGCGTGA	TATGTCTGAC	GGTGAAGTCA
12181	AACAAATGGA	TGCCCAGCTG	GAAGCCCTGA	AAATACCCCG	CGAAGCAGCA	CAGATCGAGG
12241	TGGAATATCA	GGAGACCCAG	CAGGCCCATTA	CTCAGGCTCA	GTTAGACCTG	TTACAGCGTA
12301	AATTCACAAA	CAAAACCGCT	TACAGTTGGA	TGCGCGGCAA	GCTGAGTCTC	ATCTATTACC
12361	AGTTCTTTGA	CCTGACCCAG	TCTTCTCTGC	TGATGGCACA	GGAAGCGCTG	CGCCGCGAGC
12421	TGACCGACAA	CGGTGTIACC	TTTATCCGGG	GTGGGGCCCT	GAAACGTTAG	ACTGCGGGTT
12481	TGATGGCGGG	TGAAACGTTG	CTGCTGAATC	TGGCAGAAAT	GGAAGAAAGT	TGGCTGGAGC
12541	GTGATGAGCG	GGCACTGGAA	GTGACCCGTA	CCGTCTCGTT	GGCAGAGTTC	TATCAGGCTC
12601	TATCATCAGA	CAACTTTAAT	CTGACCGAAA	AATCAGCGCA	ATTCCTGCGT	GAAGGGAAAG
12661	GCAACGTAGG	AGCTTCCGGC	AATGAATTAA	AATCAGTAA	CCGCCAGATA	GAAGCCTCAG
12721	TGCGATTGTC	TGATTTGAAA	ATTTTLAGCG	ATACCCCGGA	AAGCTTTGGC	AATACCCGTC
12781	AGTTGAAACA	AGTGAGTGTG	ACCTTGCCTG	CGCTGGTTGG	TGCGTATGAA	GATATCGGGG
12841	CGGTGCTGAA	TTACGCGCGC	AGCATATTTA	TGCTCGATTT	TTGCACTGCT	ATTGCTCTCT
12901	CCGACGGCGT	GAATGACAGT	GGTCAATTTA	GTAGCCCTGAC	CAACGATTCC	CGTTATCTGC
12961	CGTTTGAAGG	TATTTCCGTG	AATGACAGCG	GTAGCCCTGAC	GTTGAGTTTC	CCGGATGCGA
13021	CTGATCGACA	GAAAGCGCTG	CTGGAGAGCC	TGAGCGATAT	CATTCTGCAAT	ATCCGCTATA
13081	CCATTCCTTC	TTAATTAATA	ACTTGTGATA	GSCAGGCTCC	TGAGGAGGCC	TGTTTAAGGA
13141	GGTTTATGCG	ASGGTTCAAC	ACCTTTGAAA	CTTGAAATAC	CGTATTGGCC	CTCTGGGGCC
13201	GATCACTAA	AAGGAATGGG	AGAAGCACTC	AATGCCGTGG	GAGCGGAAGG	GGAGCGCTAT
13261	TTTCACTGCG	CTTGCCGATC	TCTGTCCGGC	GTGCTCTGGT	GCCGCTGCTA	TCACTGAATT
13321	ACAGCAGTAC	TGCTGGCAAT	GGGTCAATTC	GGATGGGGTG	GCAATGTGGG	GTTGGTTTTA
13381	TCAGCCTGGG	TACCCGCCAG	GGCGTTCCCG	ACTATACGGG	ACAAGATGAG	TATCTCGGGC
13441	CGGATGGGGA	AGTGTTGAGT	ATTGTGCCGG	ACAGCCAGAG	GCAACCAAGG	CAACCGCACC
13501	CAACCTCACT	GTGGGGAGCG	GTTCTGACAC	AGCCGCTTAC	TGTTACCCGC	TATCAGTCCC
13561	GGGTGGCAGA	AAAATCGTTT	DGTTTAGAAC	ACTGSCAGCC	ACAGCAGAGA	CGTGAGGAAC
13621	AGACGTCTTT	TTGGGTACTT	TTTACTGCGG	ATGGTTTAGT	GCACCTATTC	GGAAGCAGTC
13681	ATCATGCAGG	TATTGCTGAC	CCGCGAGATG	AAACCAAGAT	TGCCCTCTCG	CTGATCGAGG
13741	AAACCGTCA	GCATACCGGG	GAACATATTT	ACTATCACTA	TCCGGCAGAA	GACGATCTTG
13801	ACTGTGATGA	GCAATGAAT	GCTCAGCTTT	CAGGTGTTAC	GGCCACCGCT	TATCTCGGCA
13861	AGTCCACTAT	GCAATACTTC	AGCCGGAAAC	CGCTTTTTTC	GCGGTAAAT	CAGGTATCCC
13921	TGTTGATAAT	GACTGGTTGT	TTTATCTGGT	ATTTGATTAC	GCTGAGCGCT	TATCTTGGCT
13981	GAACTCCGTA	CCCGAATTCA	ATGTCTTCAG	AAACAATGTG	TCTGAAACAA	ATGTGTCTGA
14041	AAAATGGCGT	TGTCCTCCGG	ACGTTTCTTC	CCGCTATGAA	TATGGGTTTG	AAATTGGAAC
14101	CCGTCGCTTG	TGTCGCCAAG	TTCTGATGTT	TCATCAGCTG	AAAGCGCTGG	CAGGGGAAAA
14161	GSTTGCAGAA	GAAACACCGG	CGCTGGTTTC	CCGTCTTAT	CTGGATTATG	ACCTGAACAA
14221	CAAGSTTTCC	TTGCTGCAAA	CGGCCCGCAG	ACTGGCCCAT	GAAACGGACG	GTACGCCAGT
14281	GATGATGTCC	CCGCTGGAAA	TGGATTATCA	ACGTGTTAAT	CATGGCGTGA	ATCTGAACCT
14341	GCACTCCATG	CCGCACTTAG	AAAAAATGAA	CACGTTGCAG	CCATACCAAT	TGGTTGATTT
14401	ATATGGAGAA	GGAATTTCCG	GCGTTACTTT	ATCAGGATAC	TCAGAAAGCC	TGGTGGTACC
14461	GTGCTCCGGT	ACGGGATATC	ACTGCCGAAG	GAACGAATGC	GGTACCTTAT	GAGGAGGCGA
14521	AACCACTGCC	ACATATTTCC	GCACACACAG	AAAGCGCGAT	GTTGTTGGAC	ATCAATGGTG
14581	ACGGGCGTCT	GGAATGGGTG	ATTACGGCAT	CAGGTTTACG	GGGCTACCAC	ACCATGTCAC
14641	CGGAAGGTGA	ATGGACACCC	TTTATTCAT	TATCCGCTGT	GCAATGGGAA	TATTTCCATC
14701	CGCAGGCAAA	ACTGGCTGAT	ATTGATGGGG	CTGGGCTGCC	TGACTTAGCG	CTTATCGGGC
14761	CAATAGTGT	ACGTGTCTGG	TCAAATAATC	CGGCAGGATG	GGATCGCGCT	CAGGATGTTA
14821	TTCAATTTGTC	AAATAGCCCA	CTGCCGGTTC	CCGSCAAAAA	TAAGCTTCAT	CTTGTGCGAT
14881	TCAGTGATAT	GACAGGCTCC	GGGCAATCAC	ATCTGGSTGA	AGTTACCGCA	AAATAGCGTC
14941	GCTACTGGCC	GAACCTGGGG	CTTGAATAAT	TTGGTGAGCC	TCTGATGATA	ACAGGCTTCT
15001	AAATPACGGG	GAAACGTTTA	ACCCCCACAG	ACTGTATATG	GTAGACCTAA	ATGGCTCAGG

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Fig.2.

15061	CACCACCCGA	TTTTATTAT	GCCCGCAATA	TTTACCTTGA	ACTCTATGCC	AATGAAAGCG
15121	GCAATCATTG	TGCTGAACCT	CAGCGTATTG	ATCTGCCCGA	TGGGGTACGT	TTTGATGATA
15181	CTTGTGGGTT	ACAAATAGCG	GATACACAAG	GATTAGGGAC	TGCCAGCATT	ATTTTGACGA
15241	TCCCCCATAT	GAAGGTGCAG	CAGTGGCGAT	TGGATATGAC	CATATTCAAG	CCTTGGCTGC
15301	TGAATGCCCT	CAATAACAAT	ATGGGAACAG	AAACCAAGCT	GTATTATCGC	AGCTCTGCCC
15361	AGTTCTGGCT	GGATGAGAAA	TTACAGGCTT	CTGAATCCGG	GATGACGGTG	GTGAGCTACT
15421	TACCGTTCCC	GGTGCACTGT	TTGTGGCGCA	CGGAAGTCT	GGATGAAAT	TCCGGTAACC
15481	GATTEACCAG	CCATTATCAT	TACTCACATG	GTGCCTGGGA	TGGTCTGGAA	CGGGAAGTTT
15541	GTGGTTTGG	GCGGGTGACG	CAAACTGATA	TTGATTACCG	GCGGAGTGGG	ACACAGGGGA
15601	CACATGCTGA	ACCACCGGCA	CTTTGDCGA	CGGTTAATTG	GTACGGCACT	GGCGTACGGG
15661	AAGTCGATAT	TCTTCTGCCC	ACGGAAATAT	GGCAGGGGGA	TCAACAGGCA	TTTCCCCAT
15721	TTACCCCAAG	CTTTACCCGT	TATGACGAAA	AATCCGGTGG	TGATATGACG	GTCAAGCCGA
15781	GCGAACAGGA	AGAATACTGG	TTACATCGAG	CTTAAAGAGG	ACAACGTTTA	CGCAGTGAGC
15841	TGTATGGGGA	TGATGATTCT	ATACTGGCTG	GTACGGCTTA	TTCACTGGAT	GAATCCCGCA
15901	CCCAAGTACG	TTTGTTACCG	GTGATGGTAT	CGGAAGTGGC	TTCGGTACTG	GTTCGGTGGG
15961	CCGAATCCCG	CCATAACCGA	TATGAAGGGG	TTGTTACCGA	TTCCACAGTG	CAGCCAAAG
16021	ATTGTCTTTA	AATATGATGC	GTTAGGATTT	CCCAGGACA	ATCTTGAGAT	TGCTTATTCG
16081	AGACGTCCAC	AGCCTGAGTT	CTGCGCTTAT	CCGGATACCC	TGCCCGAAAC	ACTTTTCACC
16141	AGCAGTTTTC	ACCAACAGCA	GATGTTCCCT	CCCTCTGACAC	GGCAGCGTTT	TTCTTATCAC
16201	CATCTGAATC	ATGATGATAA	TACGTGGATC	ACAGGGCTTA	TGGATACTTC	ACCGAGTGAC
16261	GCACTGATTT	ATCAAGCCGA	TAAAGTGCCT	GAUGGTGGAT	TTTCCCTTGA	ATGTTTTTCT
16321	GCCACAGGTC	CAGGAGCAAT	GTGTTGGCTT	GATGCTCGCAG	CCBATTATCT	GGGACATCAG
16381	CGTGTAGCAT	ATACCGGTCC	AGAAGAGCAA	CCCTCTATTC	CTCCGCTGGT	GGCATACATT
16441	GAAACCCGAG	AGTTTGATGA	AGATCGTTTG	CGCGCTTTTG	AGGAGGTGAT	GGATGAGCAG
16501	GAGCTGACAA	AACAGCTGAA	TGATGCGGGC	TGGATADCGG	CAAAAGTCCC	GTTCAGTGAA
16561	AAGACAGATT	TCCATGCTCTG	GGTGGGACAA	AAGGAATTTA	CAGAATATGC	CGGTGCAGAC
16621	GGATTCTATC	GGCCATTGGT	GCAACGGGAA	ACCAAGCTTA	CAGGTCAAAC	GACAGTGACG
16681	TGGGATAGCC	ATTACTGTGT	TATCAACCCA	ACAGAGGATG	CGGCTGGCCT	CGGTATGCCA
16741	GCGCATTAAG	ATTATCGATT	TATGTTTCCG	CATAACACCA	CAGATATCAA	TGATAACTAT
16801	CACACCGTGA	CGTTTGATGC	ATCGGGGACG	GTAAACCACT	TCCGTTTCTG	GGGCACTGAA
16861	AACGGTGAAA	AACAAGGATA	TACCTCTGCG	GAAGATGAAA	CTGTCCCTTT	TATTGTCCCC
16921	ACLAAGCTCG	ATGATGCTCT	GGCATTGAAA	CCCGGATAC	CTGTTGCAGG	GCTGATGGTT
16981	TATGCCCTTC	TGAGCTGGAT	GGTTCAGGCG	AGTTTTCTTA	ATGATGGGGA	CTTTTATGGA
17041	GAGCTGAAAC	CGGCTGGGAT	CATCACTGAA	ATGCGTTATC	TCCGTCTGCT	TGCTTTTCCG
17101	CGCTGGCATC	AAAATAACCC	TGCCGCTGCC	ATGCTAAAGC	AACTCAATTC	ACAGAACCCA
17161	CCCATGTATC	TGATGTGTAT	CACCGACCGC	TATGATGCGG	ATCCGGAACA	ACAAATACGT
17221	CAAACTGTTA	CGTTTAGTGA	TGTTTTTGGG	CGAACTTTTA	CAAAACAGCC	TACGCCATGA
17281	AAGTGGTGAA	GCCGTGGTAC	CTGATGAGTA	TGSAACCAAT	GTGGCTGAAA	ATCAAGGCGC
17341	CCCTGAAACG	GGCGATTACA	AATTTCCCGT	TGGGCAATTT	CCCGAAGTTA	CAGATATTTA
17401	ACGGGAAAGG	GCAAAGCCCC	TGCGTTACGT	TTCAAACCGT	ATTCTTGAAA	TAAATTTGGC
17461	AACATATGTA	AGTTGACCAA	AAAATGCCCG	GCAGGATATG	TATGCCGATA	CCCATTTACTA
17521	TGATCCGTTG	GGGCGTGAAT	ATCAGGTTAT	CACGCCAAAG	GCGGGTTGCG	TGATCTCTTA
17581	TTCACTCCCT	GGTTTGTGGT	GAATGAAGTT	GAATATGACA	CTCCCGGTGA	ATGACAGCAT
17641	AAAGCTCAGT	GATGCCCTGT	CAGTGAACAG	ACATCACTCC	ATTTAGGAAT	GAATCATGAA
17701	GAATTTCTGT	CACAGCAATA	CGCGTACCT	CACCGTACTG	GACAACCGTG	GTCAAGACAGT
17761	ACGCGAATA	GCCGTGGTATC	GGCACCCCGA	TACACCTCAG	GTAAACGATG	AAACGATCAC
17821	CGGTTATCAA	TATGATGCTC	AAGGATCTCT	GACTCAGAGT	ATTGATCCGC	GATTTTATGA
17881	ACGCCAGCAG	ACAGCGAGTG	ACCAAGACCG	CATTACACCC	AATCTTATTC	TCTTGTCTATC
17941	ACTCAGTAAG	AAGGCATTGC	GTACGCAAG	TCGCGATGCC	GGAAACCGTG	TGCCCTTGCA
18001	TGATGTTGCC	GGGCGTCCCG	TTTTAGCTCT	CAGTCCCAAT	GGCGTTAGCC	GAACGTTTCA
18061	GTATGAAAGT	GATAACCTTC	CGGGACGATT	GCTAACGATT	ACCGAGCAGG	TAAAGGAGA
18121	GAACGCTCT	ATCACCGAGC	GATTGATTTG	GTACAGGAAT	ACGCCGCGAG	AAAAAGGCAA
18181	TAATTTGGCC	GGCCAGTGCG	TGGTCCATTA	TGATCCCAAC	GGATGGAATC	AAACCAACAG
18241	CATATTGTTA	ACCAGCATAC	CTTTGTCCAT	CACACAGCAA	TTAGTGAAAG	ATGACAGCGA
18301	AGCTGATTGG	CACGGTATGG	ATGAATTTGG	CTGGAAAAAC	CGCTTGCGGC	CGGAAGCTT
18361	CATTCTCTGC	AGCACAAACG	ATGCTACCGG	CACGGTATTA	ACCGATACAG	ATGCTGCCCG
18421	AAACAAGCAA	CTATATGCTT	ATGATGTGGC	CGGTCTGCTT	CAAGGCAGTT	GGTGGCGGCT
18481	GAAGGGGAAA	CAAGAACAAG	TTATCTGTAA	ATCCCTGACC	TATTCCGCTG	CCAGCCAGAA
18541	GCTACGGGAG	GAACATGCTA	ACGGATAGT	GACTACATAT	ACCTATGAA	CCGAGACCGA
18601	ACGAGTTATT	GGCATAAAAA	CGAACGCTCC	TTCCGGTCAT	CGCGCTGGGG	AGAAAAATTT
18661	ACAAAACCTG	CGTTATGAAT	ATGATCTCTG	CGGAAATGTC	CTGAATCAA	CTAATGATGC
18721	TGAATTTACC	CGCTTTTGGC	GCAACAGAA	AATTGTACCG	GAAATATCTT	ACAATATGTA
18781	CAGCTCTGAC	CAGCTGGTTT	CCGTCACTGG	GGGTGAAATG	GCGAATATTT	GCCGACAAAA
18841	AAACCAAGTTA	CCCATCCCGG	CTCTGATGAA	TAACAATACT	TATACGAATT	ACTCTCGCAC

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Fig.2.

18901	TTACGACTAT	GATCGTGGGG	GAATCTGACC	AGAATCGCAT	AATTCACGAT	CACCGGTAAT
18961	AACTATACAA	CGAACATGAC	CGTTTCAGAT	CACAGCAACC	GGGCTGTACT	GGAGAGCTG
19022	GGGCAAGATC	CCACTCAGGT	GGATATGTTG	TTCACCCCGG	GGGGGCATCA	GAACCGGCTT
19081	GTTCCCGGTC	AGGATCTTTT	CTGGACATCC	CGTGACGAAT	TGCAACAAGT	GATATTGGTC
19141	AATAGGGAAA	ATACGACGCC	TGATCAGGAA	TTCATCCGTT	ATGATGCAGA	CAGTCAGCGT
19201	GTCATTAAAG	CTCATATTCA	GAAGACAGGT	AACAGTGAGC	AAATACAGCG	AACATTATAT
19261	TTGCCAGAGC	TGGAAATGGG	CACGACATAT	AGCGGCAATA	CAATTAAGA	GTTTTCGAC
19321	GTCATCACTG	TGGGTGAAGC	GGGTGAGSCA	CAAGTGCGGS	TGCTGCATTG	GGAAACAGGC
19381	AAACCGGCGG	ATATCAGCAA	TGATCAGCTG	CGCTACAGTT	ATGGCAACCT	GATTGGCAGT
19441	AGCGGGCTGG	AATTGGGACA	GTGACGGGCA	GATCAATAGT	CAGGAAGAAT	ATTACCCCTA
19501	TGGGGGAACC	GCCGTGTGGG	CACCGGAAAT	CAGTCAGAAG	CTGATTACAC	AAGCCGGCGT
19561	TATTCCTGGC	AAGAGCGGGA	TGCAACAGGG	TTGTATTACT	AGGCTTACCG	TTATTTATCAA
19621	TGCTGGACAG	GGCGATGGTT	GAGTGTAGAT	CCTGCCGGTG	AGGCCGATGG	TCTCAATTTG
19681	TTCCGAATGT	GCAGGAATAA	CCCCATGGTT	TTTTCTGAFT	CTGATGGTCG	TCTCCCGGCT
19741	CAGGGTGTCC	TTGCCCTGGT	AGGGAAAAAA	GCGTATCGAA	AGGCAGTCAA	CATCAGGACA
19801	GAACACCTGC	TTGAACAAGG	CGCTTCCTTT	GATACGTTCT	TGAATTAATA	CGAGGAGTTG
19861	CGAACGTTTG	TTTTGGSTGT	GGGGGTACAA	GTCTGGGGGT	GAAGCGGCCA	CGATTGCGAG
19921	AGCGTCCGCT	TGGGGGATCG	TGGGGGCTGC	CATTGGTGGT	TTTGTCTCCG	GGGCGGTGAT
19981	GGGTTTTTTC	GCGAACAAAC	TCTCAGAAAA	AATTGGGGAA	GTTTTAAGTT	ATCTGACGCG
20041	TAAACGTTCT	GCTCCTGTTT	AGGTAGGCGC	TTTTGTTGTC	ACATGGCTTG	TGACGTCCTG
20101	ACTATTTAAC	AGCTCTTCGA	CAGGTACCGC	CATTTEDGCA	GCAACAGCGG	TCAACGTTGG
20161	AGGATTTAATG	GCTTTAGCCG	GAGAACTATA	CACGGGCGATG	GCATACAGTA	TGGCCACACC
20221	CGCGGACAA	AGTACGCTGG	ATAAGCTCAG	GCCCGGTAAT	GTGAGCGCGC	CAGAGCGGTT
20281	AGGGCACTAT	CAGGCGCAAT	TATTGGCGGC	ATATTACTTG	GCCGCCATCA	GGGAAGTTCT
20341	GAGCTGGGTG	AACGGGCGAG	GATTGGTCTT	ATGTATGCTC	CTCGATGGGG	AAGSATCATT
20401	GGTAATCTAT	GGGATGGCCC	TTATCGGTTT	ATGGGCAGGT	TACTGCTCAG	AAGAGGCAAT
20461	AGCTCTGCCA	TTTCCGACCG	TGTCAGTTCC	AGGAGCTGGT	TTGGCCGAAT	GATAGGAGAA
20521	AGTGTGCGGA	GAAATATTTC	TGAAGTATTA	TTACCTTATA	CCCGTACACC	CGGTGATTCG
20581	GTTGGTGCAG	CCATTGGCGG	GACAGCGCGG	GCGGTCATC	ATGCGGTTGG	AGGGGAAGTT
20641	GCCAAATGCC	GTAGCCCGGT	TACCTGGAGC	GGCTTTAAGC	GGGCTTTTAA	TAACTTCTTC
20701	TTAAAGGCTT	CTGCACGTC	TAAATGAATC	GAAGCATAAC	AATCATGTTT	ATTCCCACTT
20761	TGTCATGGAT	GACAGGTGCG	GTTTTTCCGA	TGTGTGGACA	GAGACCGCTT	CAGGCTCTCT
20821	GTCCAGTTAA	TTTTTGATAT	AAGAACTAAT	GGTGTAACTG	ATATGCTAAT	TGATATCGCT
20881	CAGGCTGAGC	AATAAGCTTT	TCTGTTTTAC	ACTCATACCG	GGAAACTGTA	GGGTTAATGT
20941	GGCTGTATCG	GCCACAGGAA	GGCTTTTATA	TGGCAGGTAC	TTAGCATCAT	TGAATTCOAT
21001	CTGGAATTGA	CCACTGTGAT	TGATGCCATG	TGAGATCACA	ATCGCTTTGG	AGCCACGTGG
21061	CATCATTTGA	CTGCCGCGAT	AATCATGAT	TGCCCGGACA	TCTGTATAAG	GCCCTAAGAG
21121	GGCAGGTAAC	GTCACTACTGA	TTGTTTGTAT	ACGGCGTGTA	TTACCTAATC	CGTCAGGATA
21181	ATCGGTAGCA	ATATTGAGAT	CCGATATTTT	GAGGCTGGCT	TGCAGTTGTG	TCCCTTCGAC
21241	GTTCRAACCG	TTAAGCGTTG	TGCTGTGACT	GCCTTCACCT	GCATTGACTA	ATCAGTCAC
21301	TTTATCTTTT	AAAATGAAAC	TATTTTCTGT	CAGACCGACA	TACCTTTCAG	CCAGAGAAAC
21361	GGTTCTGGTG	ACCTCCAGTG	CCCGTTCTAT	TTTTTCCAAA	TAGCTTTTTT	CCATCTGTGC
21421	TAAATTCAGC	ATCAGGGTTT	CACCCGCTAA	TAAACCCGCA	TAACTCCCAT	GCCAGGCACC
21481	TGGTTTAATA	AAGTGTGCTG	CCGCAATATT	CAATTCATAC	TGATAAGTTT	GCTCTGCGAT
21541	TAAACAGAGT	GAGACCGCCA	AATCATATAA	CTGATAATAA	ATAGGCGACA	ACGTTCCACG
21601	GAGCCAGTTG	TATAGCGCTG	CATTACTGAA	TTTACTTTGC	AGAAAGGCTA	ACTGCGCTTG
21661	AGTTTGTGCG	TGCTGAGTTT	CCGATAGTTT	TTTTTGTAA	ACTGCCGCTT	CACGAGGTAC
21721	AGCCAGCGTC	GCTAATTGAG	CATCAATTTG	TTTTTCTCA	GCCTTCGCTT	TATTGGGTG
21781	AATTTCCGAC	TCTTGCGGAC	GGCGACGGTA	TATTTCTGAT	TGGCTGATTT	TGCTGCGGCG
21841	AATACGTTGT	GCTGACGCG	AAATTTGAGT	ACCAATGGCA	CTGGCATTGA	AAAGCGGCCC
21901	AAAACCGGAA	CCTCCGACAG	CAAAACCGTA	AATATTGGGG	ACGAGATCTG	CCGCGGCGGC
21961	GGCCATATGC	AGGGCTGTGC	CGCTGCTGCT	CAAGACCGAT	GAAGAGAGGT	AAAGATCCAT
22021	CGCTTGTTTT	TCACGAGCGT	TACATCTTTC	GTGTAACAG	GTATTGAAC	TGTCMAAAC
22081	AGACTGTGCA	CCATGACGGC	TTCTTTGAGG	CGCCAAATTA	TCAGCATCAA	TCTCAGCCAT
22141	GACCTTATCC	TGCAATTTAA	TACTTTGCGC	GGCTAACTTA	CTGCCCTTGAG	TTTSCASTAT
22201	TTGAGCCAA	GCTTCTGCA	CCTGCGGTTT	AGTAATGCTG	AGCAGCGTAT	TGCCAAATTT
22261	TATCAACTGG	CTTACCCCCC	ACTTGGCATT	TTCCGGAATC	ACCGSAAAC	GGTACATCGG
22321	CATCACTGCA	TGAGGTAAAT	CGCGGCGGCG	TTGTGAAGCA	GTGATGGCAG	CAGTCAGTAA
22381	CATGGACGGA	TCTGCGGGCG	TGGCATAGAG	AGATAATGAC	AGTGGCTGAC	CGTCGATTCT
22441	CAGGTTATGG	CGTAAGTTAT	AGAGGCGTTG	CGTCAATGTC	TGCCAGTAAC	CTTGCAAGTTT
22501	TTTATTAATT	TGAGGGAGGA	ACAATGCGGT	TAAAGAAATF	TGCGGTACGT	TTCTGCGGTA
22561	ATGCAGCGCG	CTGACGCGAT	TGCAGCATTT	TATGTTGATA	ATGATGCGCG	ATTGTTTGGC
22621	TGSCAGCTTC	TTCCAGCGGT	GGCTCTGACC	AATGCTTATC	CAATGAAAAA	TAAAGGTCAT
22681	CACCCATAAA	AGTGAGCGCC	TGTACATAAC	ACATTTTACC	TTGCTTTAAG	GTATCAGGTT

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Fig.2.

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22741	CAAGCTGGCG	ATAGGCGCTA	TCTCGCGCG	TAATCAACAA	ATCCAGCATT	TTCATAAAGG
22801	TAGCCACTTT	ATAGTGCATC	GCATCATGCT	GGGCAACGGC	GTECGGATCG	ACCGAATCCA
22861	GCGGATTGGC	ATTCCAGGAC	GTATCTTCCT	CCAAATGGGCG	GACGTTCCAG	TAATAATCCT
22921	GCAJTTCACC	CTGAACCGAA	TATCCGGTCG	GGTTCAGATA	TAGCGCAGCC	AGCGTGTCCA
22981	TCCGSTAAAA	TCTGCTCTTG	CAATAAGCGC	TGGAATACCA	TCATGGGCGT	TGTAATAGAA
23041	CAATCCCAAG	AAATAGATTG	CATTGGCGCC	GTFTGAAATC	CATGGGTTCA	GTGTTATTTT
23101	TCATGACACG	ACTTGAATAC	CCCTTTTATA	TTTTTTGATA	TTTTTTACTA	TCCCTGTGTG
23161	TGTCATTCCC	GAATCATGAT	DGGCATCAT	AGTGAATATA	AATTGATTTT	TCGTCTCATC
23221	AAAATAAAAG	AAAGCAGATT	CCCAGGATTT	GTCATAGATA	ATTTTTTTGT	ACCCAACCCC
23281	TAATCTGACA	CCTTCACGTA	TGTAATATCC	TTTAGCATAG	GGAAACAAAG	GGSTTACTGT
23341	GGTTTCAATA	TCAGATAACA	TTCTTTGSTA	ATAAGSTTGT	CTGGCAGAAT	TGCCATCAAT
23401	ATTCCCAATA	TGGATCTTAA	ACCAACGTTT	ATCACCATGC	TCCTCTTTAT	TGTAGGGCGG
23461	CAACTTAAAT	GTEGCATAAA	ACCCCTTCAAC	TAATZGCGGC	TCTGGTAAAT	TTTGGGTTTC
23521	CATACTTAAA	ACATTATCAA	TACCAATATT	GGCTCTTTCA	GCTAATTTTC	TGGAAAATAA
23581	AGTATTTAAC	CGGTTTCTGT	AAGGGCCAAAT	CTGCATATAT	TGTGTGCTGC	ATGGCATTTT
23641	ATGCAGTGAT	ATAACGTTAC	TGTATCTTTT	GGATTTTAGT	TTTATATGAA	TTGGCGATTTC
23701	AATAACABTA	TCGTTATAAC	CGCCGTCGGG	TGTCTTAATA	ATAAACTCGC	TCACCGAGG
23761	AATATCATAG	CCTTCAATAT	CAACTTTTAC	TTGATTAAAA	TCATATACCA	TAGGGTCAGA
23821	TTGCTGTGAA	GGTTTAGATG	CCACATGGTC	TCACGCAFTT	AACTCCACTA	GAATATCAGA
23881	GCCATTTTIT	AATAAAAAAC	TAATGTTTTT	ATCTTGGATC	TGTTCCGATCA	TAGATGAAGC
23941	AGTTTTTATT	ATCTGTGCTT	GGTTGAACAT	AAATACACCC	ATGGATCTTC	CGGAAGGAAC
24001	AGTCCCGCAA	TATTTCCCAT	GTATTAAATG	ATTGAACAT	CATTAGTAAA	TATTACCAT
24061	ATAGTATGCC	ATACTCTCTT	GTTATCTTTT	CAATCTAATA	CTATGTTAGT	ATCAAGTTTG
24121	AATTCAGCAT	CATCTGATTC	ATAATCATAA	TTTATACCAA	CTCCAATTTT	TGATTTTCTA
24181	GGAAITTTTT	CTTGGSTTCT	TAGATGCATT	AACACTCTAA	AAATTTGGEC	ATTTTAAAGA
24241	TCGATGGAAA	TAATAAAATC	CMAAGTTCCA	TAATGAAAAA	CTTCTTTCTT	TTTTCCAAAG
24301	ATTTTCATCAT	GTCTATCATA	ATCAAAATAA	ATAACCGTTT	CATCTTTCTAC	CATCGATAAC
24361	AGGTATTTAA	CTTCATCAT	ATATATATTG	CTTTTGGAAA	AAATTAATTT	CATTGAAGGA
24421	TTGAAACGTA	AAATTAATATG	ACCATTTTCT	GGTGATATAT	ACGAGAGATC	AAAAATATTT
24481	CCGGTAAABC	TGGCTAATTT	ATTTTTTGTG	GTTATAGATT	CTTTATATTTC	GGCCAAATAA
24541	TCTSTAGCAA	ATTGATTTGT	GACTTTTGTAT	TCTGTCTCTG	TATCAAGTTT	TGATAATGTG
24601	CTCTTAACAA	TGGCGTCTAA	ATCATTTTCT	GTGAGAATGG	ATATGTCTAT	ATCAGCGTTA
24661	ATGGTCAATC	CTTCTCTTGC	AGGAAGACTA	TTAAAAGAAAT	AAATGTCTTT	TTTCTCATGG
24721	AAATAAACRA	TAATGACGTC	TTTTTCATAA	TCACAAAGAAC	AAATCATACC	AATGCTGGCT
24781	TTTTTATTGA	TCAGGTTTTT	TATTTTATCA	GTCAATTAAT	AAATTAACCG	TGAGCTCCAG
24841	CTGCCATCAT	AACGAATATG	TGACAGTTTT	AAATATATAAT	CAGTGATATC	TATCTTGCCA
24901	TCTTCACTTT	CATTTTTCAG	CTCTTTTTGT	TCCAGCCACA	GTAAATACAA	ACGAGACTTG
24961	TAAATAACAG	GTCTGATATT	TTCTTGCCAT	ACATTGATGG	GTATTTCAAT	TTTTTTCCAT
25021	TCTCCCCAGG	CATTGGCAGC	AAATTGACCG	TGCTGGCACT	TTTGGTGATC	GACATTGCGC
25081	CAATAATATA	TTCTGGSTTC	TGCTGGGCTA	TAAACCAATTA	ATAAGTGAG	CCCTTCATTG
25141	ACATTATATC	TGTCATGATA	TCCGCTAATC	ACCTGCAAGT	TAGCGACATC	TTCAAAATGG
25201	GTGAGATAAT	TTTTAAAGCT	ATCTTCAACG	GTATCGATAT	TTAACTGACT	TTGGGAAAGT
25261	TGCTGTAAAC	GGTTGTTTCT	CATACCTGTC	TGACCAATAC	GAATCTGTGG	GTGATATAG
25321	TTTTCCGGAT	AATAGGCCAG	TTGAGATACG	CCGGCCCGAG	TGCTATACCG	TGCAATTGTAG
25381	GTTTCCCAAT	CGCAGAGAGAA	CTGACGGGTT	TTCACTGGCT	TTGATACTTT	TCCTTCAACA
25441	TTAATCAACG	CCCGSTTGAC	ATATAACTGA	ATGCTGGCAA	TGGCTTCTGC	CACACGGGTG
25501	GTTTTCACTT	GGGCAGAAAC	TTGGTTATCA	ATCAGCAGAT	AGCTGTACAA	CTCATCCCGG
25561	CTCTTAATCT	GTGAGGTGCT	ACCATTTTTG	ATGTAGTAAG	CAGTGGCCGC	TGTCGTCTGT
25621	GCTTCATCCA	GCCATGCTTG	AAGCTGGTCG	GATTGTTGAC	TGTTAGTTCC	CGCTTGCAAC
25681	AAAGTACTGG	CGGCTTGCCA	ATCATCAAAAT	GTTGGCATCG	GGGTTTCCGG	TTCAACGACA
25741	TATTTTAATT	TTATGAGTGC	AGCAACACCA	TCCGGGGTAA	TACCCAATGT	AGCAGCGACA
25801	TCCAGCCATT	GCAGAGTGAC	ATCTATAAGT	TCTCCAGTTG	GTAAAGGTAT	TCACCTCCCA
25861	ACCGGTCTGT	TGCAATGCTT	GTGTCAACAC	CTGAGCATCA	AAATTTTAAC	GCCACCGCCA
25921	AATTGTTCCG	CAGTCAACGC	TGCTAAGTTT	CAAAATGCTGT	TAAGATTTTG	TGCGTAGCT
25981	TCACAAACGA	TGATCACAGC	ATGGAAGCGG	GTCAGCGCTT	GCAAAGTGGG	GAGATCATGT
26041	TGCAAGTGCTG	TGTTTTCTGA	TTGGAATTTT	TCCGGTTTTG	TCACCAACAG	GGTCAGTTCC
26101	TTTTTCTGTA	GTCCAATATT	GCGCACAAAT	AGAGAAAGTT	GCCCCAGTAC	CTGACAAAAA
26161	GCCACCATGT	TGCTGGTTTC	ATCTCTGAG	CGATCACGGT	TAGCCGCAAT	ATCTATGAAA
26221	TCATCGAATG	TCAGTCTTTG	TGTTTTTATC	TGATTAATCC	ACAGCAAAAT	AGTTTTCTGT
26281	GTCTTGGCTG	AATCCATTTG	AATGCTGGCA	GCAATCAGCG	GCGCAGCTGC	ACGATCATGT
26341	TGCTCATCAC	CGAGTGAAAG	TGTTGATAAT	CCATTACTTA	GTGTCTGTAT	AAGGTTTTCA
26401	ATAZCCGGCG	TAAGGACACT	GCTGTAAATTA	TCCGTGGTCA	TCAGAAACAC	ATCATGACA
26461	GACCAATTTCT	GTGTTGTCTG	CCACTGGGTG	CATTGGAAACA	GAAAGCTGAT	TAATGGCGTT
26521	AATZCTGTAT	CAGRAAAAAG	GGCAATTTTC	GTGTTCAAT	AGCGAGAAAC	CGACAACAC

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Fig.2.

26581	ATGGATAATT	CATTCACTGT	CAGATGATGA	ATGTCTGCCA	GCAGACGAAC	GGGATAAAGC
26641	AGAGACAGGT	TCTCGATGGA	ACACATAAAT	TCTGGATTTC	TTCCGCCATT	AGCCAGTTTC
26701	CATAATGTAT	ACAGTTCACT	ATCATTCAC	CTGAAAGCAC	GTTTCATTAT	TCCCAATATA
26761	AAATGGTTTT	TTGATTCAAC	GGGGGTTAAA	TCCAGTTTGG	TATTATCAGC	AGAAAACCTC
26821	TGSCCATTTA	ATAGCGGTGT	ATTGAACAGC	ATTGTAAAAT	GACTGGGTTC	TTGTTTAGTG
26881	GAATATTGGC	TGATACTGA	ATGACACAT	ACCAGCGCAT	CGCTGACGCT	AATATTATAG
26941	TGCTGCATAT	AATATTGAAC	ATAAAACAGC	TTACCCAAAC	CAGTGCCTGC	AATGGTTAAG
27001	TCATCATAAA	PACTTTCTAT	TACTTGCCAG	ATATCTTCTG	GAGATATGCC	TGTGGCTTTA
27061	TACAAACGAA	TGCTTTTATT	CAGCTTTAAC	AGGAATATAT	CACCGGGAAC	TCCATCATT
27121	TAAAGTGTGC	ATTGGCATTG	ATAGCATCCG	ACGGATTTCG	TTAACTCCGC	ATAAGCGGAG
27181	TGTTATACCG	TGGTGATTT	GCTCTGTCTG	CAATTTAATG	GGAACTCTGT	AATGGGTATT
27241	AGCAATGGGG	ACGAAATTTT	TATCTTGGTA	TATATACTCT	TTATCTCCAT	TCTGGAGAAG
27301	AAAATCCAAG	TGCTCAGGTT	CTGTTTTTTT	TACACTGAAA	TTATATTTGT	ATTCATTTC
27361	TTTGATTGGA	ATTAGCTCTG	CATAGTTTAA	ATGTGAATCG	TAGAAATCTT	TGCGGTTTCG
27421	CTTAATCAAT	CTGCGCGTTC	CCGTATCAAT	CCCGTCATTC	ACCAATGTAT	TCAGTTGCTC
27481	ATTCTTATAC	TGTGGATTTC	TATTTTCTCT	ACCGAAGGAG	AGATTGACAA	ATAAACTGAG
27541	TTCTCATATA	GACAACTCTG	AGTAGCGAGC	CAAGAAGACA	TAACCTTTAA	AAATCACTAC
27601	ATCATCTGTA	CCGAAATTTT	TTCTCATCAG	TTCTGTTGAA	TTTTCCGGTG	TAATTTCTTC
27661	TACAAGGATT	TGATACAATT	CAGGCGATAT	ATCAGTCTTA	ATAGCCAGTA	CCGATGTTGG
27721	GTCCATTAAAT	TCCGCTACGT	CTGTATTACG	GCTAAATGCG	GTGAGGTTTT	TATCTTGCAA
27781	TAAATTTGCC	TGACGGGCTG	ACTCATACGG	CAGATGATAG	GGTGTCATCG	CGGTTTCCCG
27841	GTAAGTGGAC	AACATTTTCA	TTACACGTTT	ATAGTCAGTT	TTCTCTAACG	TCTGAATATT
27901	ATTCCAGCAGT	AATTCATTAGT	ATAAGGATAA	TGTGGAAATT	TCTTCATCCA	TATTATCTCG
27961	TGTCAGTGGC	AGTGAAGCAA	TGTCGGGGCG	TGTTTTATTC	AGGTGATATT	GAGAATTGTC
28021	AGGATGAAAA	TCCTTCGGCT	CCCGATATAA	TTCTGTTAAA	TAAGCCGCTG	GTGAAATAT
28081	GGAGCAATT	GATCCCGGTT	TTACAAAACG	GTGGCCGCGG	CCATAAAACC	AACCTGTTGA
28141	ACTATTGTTT	AGGGTTGACG	GTGTAATATT	AAGGTTAGTG	ATATTAGCCA	GTGTGCGATT
28201	AGCACGGGAC	AAAATGCGCA	GTTCTTCAAG	TTTATTCTGT	TTTGATTCCG	GATGAGCCTG
28261	TTGATATAAA	AAGTCTGTTT	CTCGCCACGT	CAGAGTTCCA	CTTGTCTCTAT	GAAGAAATTC
28321	GCTGAAGAC	ATAAACGAAA	TGTTTGTCAA	TAATAAAGTA	TCACCAGCCT	TTTTGTATTT
28381	ATCTTATCTA	ACAGTTCATT	AACTTTTATC	ATATAAATCC	TTAAGTTTAT	GTCAATTTAA
28441	TGATTAATCG	TTTTTAGGTC	GAGATTATTA	TAATCTGATA	GGAAATATTAT	GTTTAATTAA
28501	ATTGATACCTG	ATTATCTGCT	CTATTCTTTC	ATAAAAAAT	AAAGAACTTC	CCTATAATAC
28561	ATGGATTTTA	ATAATGAATA	CCGTATGTTA	AAATTTAAT	TTTAACAAAC	TTTCATGAAA
28621	AAATTCAACT	CAACAAATGT	TTAAATATTT	TTAATTGTGT	TGTGCTGTGT	TGAAAAATGA
28681	ATGACTAATA	TTTATCTATG	AAAGATTATT	TATTGAGSAT	UTCTTGCTTG	GTTCAGGGG
28741	GCTACGTTGG	AGTCAGATAA	ATGTGTGCAA	AAAGAAATCC	TTAATAAAGT	TGCGTAATTA
28801	CAAAAGTTGG	TATATCTGTA	CAAGAGTGAT	AGTAATGTCA	CATRAATTTAT	TGAATACCCG
28861	AACCTCGCAA	ATGCGGGGTT	TTTCTTGGCA	TAATCAAAGA	GAAAGCTATG	AAAAAAACAC
28921	TGATTAATCT	TATTCTCAGT	ACCCTTTCTT	TTGGTGCTTT	GSCACAGCAG	GGTGCTTTCG
28981	TTTCCCGCGA	CAGCACAGAC	TATATCTCAG	GTGGATTFAA	AGGTCCAACT	CCCAACCTGA
29041	CCAGCGTTTC	TCAAGCAAAA	TCTTTCTGTC	ATGATGCGTG	GGTTGTTCTG	GAGGAAACA
29101	TTGTTAAACA	GGTTGGTCAAC	GAACTCTATG	AATTCCGCGC	CGCATAAATAC	GACTCACTAT
29161	AGGGATCGCT	TATTACGGAC	TTATCTGGAA	AGCTATCTGG	AACCCCTGTT	ACGCTGATAT
29221	AAAACAGLAT	TCAGGGAATA	CAGTGGTTCT	GTTTATGTTG	ACATTGATGA	TAAGCGCTGG
29281	ATGGGTCTGA	CGGCCACTTC	AACAGACAAA	GTTCTGATCG	AAGGTGAAGT	GGACAAAGAC
29341	TGGAAACAGTG	TTGAAATTGA	TEFCAAAAC	ATCCGCATAG	TGAATAAAT	CAAGCACTTT
29401	GAATATAGCC	CCGCACTCGC	GGGGTTTTTT	GCTTTCTGGG	AGTCGGAAAT	TTAAACGTAAG
29461	TGACGAGGAT	CAAAACTAAG	TTAACGGCAG	TGCTCACTGA	TTTGTGTCAT	AAGTTATCAA
29521	AAGTTAAAAA	TCAAAACCTTA	TTTTTTATTT	AATAGAGGAA	TGTCACCCTG	TAGGTGATAA
29581	ACGTTGACGG	ATGTAATAT	ACAGTATTTT	AGTCCTTTGA	TATGTTATTA	AATTGAAAAA
29641	CCTTTAAACT	ATATTGCGGG	GAAATTATTA	TGTCAGATGT	TCGTAATATT	ATTAAATGTTG
29701	ATAACAAATT	TGGTTGTGAA	TATAAGCGGG	ATTTATTTAA	ATAAGTTTTC	ATAATTGTGA
29761	TACACCCATT	TTCTGCATCC	CCGTTTTTTG	CTGTTGTAAAG	GAAGCGGTTT	CCATGAAGAT
29821	TTTGACATCG	TTAAGCAACT	GCACATAAAA	TTGSCAGCAG	TGGTTTCTGTG	TCACGGTTTTC
29881	ATGCAAGGAT	TGCCATAGAC	GTTCAATTTT	ATTCAACCAC	GGGCAATAGG	TGGGTAAAAA
29941	GAGAAGATTA	AATTTGGGAT	TCTTTGCCAG	CCAAACCTCG	ACCTTCGGCG	TCTTATGAAAT
30001	GCAATAGTTA	TCTAAAATTA	ACGTGATGCT	TTTGGCATT	ACATATTTGAT	TGTTAATTTTC
30061	ATCTAACCAAT	TTGATAAATA	ATCTGAGTTT	CTTTCTCAAG	CTACCGACAT	AAGTGATTTTC
30121	TTTCGTTTTTC	GCGTTGAGGC	AATTTGGCAG	GTAGTGTTTT	TGGTTCTTTTC	CGGGGCTAAC
30181	AACACGCTTT	TGTTGCCCTT	TGAAGCACTA	GTCTGCAACG	ATTTTCCGGT	TCAGGTTGAT
30241	GTCCACCTCA	TCCCTCATAGA	AGACCGGGTG	TTCTCTTTGA	GTCATTTGAT	AACGTTGCCG
30301	TGATTTTTCG	CATTTTTCAC	TCTATCTCAG	GGTCAGGCAA	TTTTACGGTT	GGTCCCGCTC
30361	TTCCCCAAAC	GATGCCCGTC	CGGCAAAAGT	AGCGATAGAG	GCTACTTTGA	GAGAGCGATG

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Fig. 2.

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30421	TATTCAGTAG	CTCATGTGATT	TTAAGTGTAA	TAAGCTCAAG	GCTCCATCGT	GAACGGAGAT
30481	AGCCAAATG	TTGTGGCGAG	TGCTGTAAATA	AGAAAGAAAT	GACTGTGAAG	AGCGGAGCTA
30541	AGTTCCAGAT	GGCAGGCCCTT	CCCGCCGGGA	GGCTTTTAAG	TCCTTCCAAC	CCGTATAATG
30601	TTAACCAATT	TACCCACGGA	TGAACGGAAG	AADGTGAACA	GTGAAGCGTT	CTGGAACGCT
30661	GAGAAACCGT	ACTCCCTTCA	GTAAACATCA	AGAGCGCGGT	GAAGCGAGCT	GCATAGTCTT
30721	TATCCCGGGT	TTCTCGATA	GCCTTTTTC	TCGGACGTDG	TTCAATTCGG	GGTATTGATG
30781	TTATGATTGG	CATGACTCAG	TCCATTTTGG	GATTTGTGTT	GATTTGGGGA	TTATTCAGAT
30841	CGCGAAATC	GGACTGAGTT	CCCTTCAAGT	GATCTACTAT	TTTGAATCT	TATTTAATCA
30901	GGAGTCAGCA	AATGAGTTAT	TCCCATTAAT	ACCTGACCAT	GTGGTTGTTT	ATCCGGGAAA
30961	TGATTCATCT	ACCGGTGGTA	TGTGGATTCC	TTGGTCCGAT	AGTCAGAAAG	ATATTGACTC
31021	TGGCCATTAT	ATCAAAGTTA	CTTTCAGTAA	AAAGGACGCT	GCTGATATTG	TGAACCTACAT
31081	GTTTCAACAT	GGCAGTTATG	TTTATTTTAC	AGACAGTAGT	AAACAATTTA	GCAATTAAGCA
31141	AATTATGTCT	GCTGATTCAG	CTAAGGCAAA	AGGGGATTAT	AAAGCTTGA	TTAAACARA
31201	CGGGAACCTT	CCACTGATGG	TATTGAATAA	ATATTGATTG	ATTATTATTT	ATGGATAAGA
31261	AATTAAGTTT	ATATTTTCATC	TGGTTTCTGC	AAATTAAGTTT	TAAAAATTAA	TTCTACTTTT
31321	TTATATGTTT	TATATTTAAT	GCCATCATAT	TTATTTTCTT	TATAATAATT	GATAGTTTAT
31381	TTATATAGTA	AATAAATTCT	TGTGGATTGG	ATTATTATTG	TGAGACGGTA	ATAATTAAAC
31441	TACAGAAAT	TTTATGTTTA	GGAAATTCAT	TCAAATTTTG	TCGGTTTCC	TGACCATGAA
31501	GAGCTGTATT	TACTGTAGAA	CTCGCATTTGA	TACTGGATTG	ATTAGCCCGA	CGAGTGTGGG
31561	GTGAGCAGAT	AATATGTTGT	ATATTGGCTG	TGGATTTTTC	AGCGAGATGA	TAGCTTTGGC
31621	AGTAAAGGCG	ATTAATAACC	GATAAACAG	AGAGAAGGAT	TGTGGCCAGG	AAAGCAAAAA
31681	AGCTCAACCA	TGACGCGTTA	TTCAACATTT	TTTTAAACCA	ACCAAGAACCC	CCCCGGGAAT
31741	TTTTATCCCT	TTATCTGCCG	GAGGCGATCC	GCTCAGTGTG	TGATTTACCA	CACATAAAGT
31801	GGAAACCGCA	GCTTTGTGGA	CAGGCAATTA	GCTCAGTTGC	ACAGTGATGT	GCTGTATTCT
31861	GTGAGACAA	CCCACGGGGA	CGGTACATTT	TATTCCTCTG	TTGAACACCA	GTCCACGCTT
31921	GATCCGTTAA	TGGCTTGGCG	GCTGATGTAT	TATTCCTCTG	CAGCCATGGC	TGCCCATCTG
31981	AAAAAAGGAC	ATACTGAAGT	CCCTTTGGTC	GTCCCTCTGC	TGTTTATCTA	TGGTAGGCTG
32041	AGGCTTACC	CTTACTCAAA	TGGATGGCTG	GATTTGTTTTA	CACCTCTCTGA	ACACCGGCT
32101	CACCTGTATA	ATCAGCCCTT	GCCGTTGGTG	GATATCAGTG	CGCTCAGTGA	TGAAGAGATC
32161	CTGACACATA	AAAGCATTTG	CTTGATGGAG	CTGGTACAAA	AACATATCCG	TGGCCGGGAT
32221	ATGCTGGAGT	GGGTTCCCCA	ATTGGTGGCG	TTGTTGAATG	CCGGTTATTA	TAGCGCCGAA
32281	CAGCGCCATG	TGTGTTAAG	CTATATTTTA	CTGAATGGAC	ATACGCTEGA	TCTGSCCAG
32341	TTTGTCCATC	AACTGACTGA	ACATATCTCG	GAGCATGAAA	CCATGTTGAT	GACTATTGCA
32401	GAACAGCTTG	AACAAAAGG	GCGTGAACAA	GCTGGAACAG	AAGGCAGAAC	AGAAGCCAGA
32461	GCTGAAGGAC	GGGAAGAAGG	CAAGCTGGAA	ACGGCGCGCG	CATTATTACG	GCATGGTGTG
32521	AGTCTGGACA	TCATTGTCAAC	TCATACCGGC	CTGACCGGGG	AGAAAATTGA	AGCGTTAAAG
32581	CATTAAATGG	ATACGCTTTT	TCACAGCAGG	ATAATGGTGC	CCCTGTGAGG	CCACCGGAAA
32641	ATTITATTTA	CTACGATTTA	CGACGGTTTA	CTTATAGGAG	CTGAATGAGA	CGCTCTTTGT
32701	TATATAACGG	TCCCATATCA	ATCTTCTCTT	TTCCGCGTAC	AGGTAAGTAA	CCCAACCTT
32761	CGTGAGCAGC	ATTTGCCAAC	AGGCCATCAT	CTTCTATGCG	TGACCAAGAG	AAGATCCCGC
32821	CCAATTTCAAT	TTTGGTTGCA	TAAATTCCTT	TATGACGAC	AGTGGCGGGG	GTATCCAGTG
32881	AAATCCAGTG	ACCACCGTCA	GCAATTAAGA	GTGCTCAGG	GTGGGTTTCT	GTGTCTGTCA
32941	CCAGTTCAAA	CTGATTTTTC	CGCGCTGCAA	TTTCAATATTC	CGCATCTGAT	TGGTTATTCA
33001	GCAGACAGAA	GAATTCGGGA	GCACCTTTT	CCATCGTGCC	CAGTGGCTCT	CTGTTCTGT
33061	TATAGCGGCG	CGTTGTGAGA	TCAGCAGCCA	GACATGAACG	TCCATAGTTA	GCAATTCGGA
33121	GGTGAATTTT	CTCCGCTTGT	ACACCTTGTG	ACAGTAAATA	GCGGATCGCC	TCATCTGCCG
33181	AGTAATCCAT	GTCCCGATCA	GGATTGGGCG	GAGGAGCGTT	ATGCGCGTCA	TATTCATATC
33241	TUGGGGGATA	CAGGTTAGTA	TGTTGACCGA	TGTATTCTGC	CCAACCGGTA	CCAAAGAAAT
33301	CGTAGGTGAT	CACAAAGATA	TTGTCTAAAT	AAGGTGCGAT	TTCTTTGAAG	CTGGACTTCT
33361	CCATTTTGGC	AACGACGGCG	CTACAGGCTA	TCGTGATTTC	TTTACGGGCG	CGGTTTCCAA
33421	AGGCGATGTT	CAGTGTCTCA	CGCAGCTCTT	TCATTAACAA	AACATAGTTT	GGGCCATCAT
33481	GTTCGCGGTC	GAATTCATTA	CCCTTCTTCA	CTGTGGCGCC	GGGGTATTTC	CAGTCCGATAT
33541	CCACCGCAGT	AAACATGGGA	AAACGCGCGG	AGAAGTGA	CGATGCTACT	CACAAATGTA
33601	GCACGTTGCT	CAGGATCTTT	GSCCATCACA	GAGAAATACC	CTGACATACT	CCAGCCGCGG
33661	ATACTGAATG	CGAGTTCCAG	CTTATGCGCT	GCTGTTTTTG	CTCGCGCTTT	CAGATTACGC
33721	ATTCGCCCCA	GTAACCGGGA	GGCTGCATCC	TGATTGTAA	ATTGCAAGAA	ATTCTTCCGG
33781	CTGGCATCAC	GGCGCTGATC	CGCTCCAGA	CCGACATTCG	GTGTGGTGGC	TAAATCACCA
33841	TAGGATCAA	CGGTACAA	ATGGCCTAAT	GTAATAGGGG	CAATCTGGCC	ACTGTGGGCT
33901	TCGCTTGGC	GTTTCCACCC	GTCACAAACC	TCATTAATCC	GTTCCGATAA	CTTGCTTTTG
33961	TCACGTTTGA	CGGCCATAAA	ACTGAAAATC	AGGCGGTCGT	AGGCGGTAGG	CGGATTTT
34021	TCCAGATCAA	AACCAAGGCC	GGGGGCATCG	TCGCTGCTCA	GCGCAGTGT	ATCCTGGGTT
34081	TCTGGCGACA	AACGCGCATC	ATACTGGCAC	CAGTCAGTAA	TATAGGCAGA	GACTTTAGGC
34141	AGCGGTTCTG	TATTTCCGG	ATCACTTCA	TATTCGTTGT	ACAGGGACTT	GGCAACAGCT
34201	GCTGAAGAAT	AATCAAGG	AGTTCCGCTG	CCGTGAGTT	TATATCCCA	CTTCTGATAG

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Fig.2.

34261	GTTCCTTCTG	TGAGTGCATC	ATATTGCAAT	ACCTCGGTTT	TTTCTCCCGG	CGGTACATCA
34321	GGCCTATTGG	GGTTACCGTG	ATCGGCAATT	TCTTCGGGTG	TGCGCTTCAG	GACATATTGC
34381	CAGGCATTCT	CATRAACCGG	TAAATCAGGT	GAAATATTGC	GGTCGGGAAT	ATGCCAGCGT
34441	TCACCCACGC	CGATGTTTTT	AAAAACCGCG	CTATCATAAA	TGACATACCA	GGTTTGACCA
34501	CCAGATTGAT	TCTGCCAGGC	AGCCAGAGAT	GCGCCTACTT	CGCTGCTGGC	GTCAGACATC
34561	GCTTTAATTG	AAGGGTATCG	ATAAACATTT	TGAGACATTA	TTTCACCTTC	GGCCCGCTTA
34621	TATTCCGGGG	CCGCTCTCTG	ATATCACTTA	GAATTGTCTT	GTTTTAATTG	ATGTTTATTC
34681	AGACGCTAC	GAACCTGCTG	GCTGAATCTA	TTACTTCGCG	CACCTCACATC	ACGCGGGGTA
34741	TAACTGCAGT	GGAGGATAAT	ATCGCTCAGC	GACTCCAGCA	GCTGATCCTG	ATCGGAACCG
34801	AATTCCAACT	TCCACTGTGA	AATGGCGCCT	GTECCTTCRA	AAGGCAGGAA	AGGTTTCATCA
34861	TCAAAATTGA	GCTTGAACAT	CGCGTGTCTT	TCCATGSCCG	TTGAATCACC	CACACCTTGA
34921	TTAGCCTGTA	CGTTCAACAA	AACGTTTTTG	GGTTTGCTGT	ATTCCAAGGG	GTTAAGCAAA
34981	TAATCGATAG	TTTTTAAGTC	AGCAGTACTG	TAAAGCGTAT	TGCTGAGTTG	TACCAAGTAA
35041	GGCCGTACAT	CTTCATAGGG	CCCCAGCAAT	GCGGGCAATG	ACAGCGCTAC	GGTTTTTATA
35101	CGCCGATCAG	CGTGGSTCGG	ATAATCGCGC	AAGAACATTT	CGGCGCTCAG	TAAGAAAGTG
35161	AATGAACCGG	TACTCTTGCC	AATTTCCGAC	TGTGATGATG	TCAGTAATGA	TTTTCAGGAT
35221	ATGGTTTTTA	TGATCTCCAG	ACGTCGGGTG	TTATGTTGCA	AATAAGCCTG	ATCCATCCGT
35281	TGTAAGGCTA	ATTTCAGATG	TTCTCCGACC	AGCAGCCCCC	GATAAAGATC	ATTCCAGAGA
35341	CCACTTTTGA	CGAATTCAT	ATCATACTGA	CCTGTTTTCT	ACTGCCAGGA	GGCTTCGGCC
35401	AGTAACACGA	GGGAATTAAAC	CGCATCATAG	CGTTGCAGGT	AAAGCCGGAG	ATTTGCGCTGA
35461	TCATCCACAT	GTATAAAGCA	TCATTGGTAN	ANTTGTTCNN	MNNNNNNNNN	MNNNNNNNNN
35521	CCGAAACATA	CCGCCAAGAC	CATCCCCCGG	ACGGCCAGAC	CGAAATATT	GGGAACCCATA
35581	TCCGCCACAG	CGSCCGCAGT	GGCGGCTGAC	TGGGCGGCGA	TCACACCTTC	AGCCGCTCTT
35641	GATTGTAAATG	CGATAACTTC	CTGCTGGGTG	ATGGAGATGT	TTTCATCATA	GAGCGATTTA
35701	TAGTCTTCT	GGCGCTCCTG	AGCGGCCCTT	CGGCTGATGG	TCAGTGACATC	CAATGAAGCC
35761	TGTTGCATGT	CAATGGCTTG	CTGTGACAGA	TTGCGGTTAA	AGCTGTACAG	CCCGAGTTGC
35821	TGCTGCATAC	GGAGTGTTC	AAAATCGGTA	TTGTCTTTTT	TCTCCAGCAA	ACTCAGTAAC
35881	GTGCTGCCGT	ACTGAATCAG	CGTTTTCTGG	GCCCTTTTTG	CCCGGCTCAT	GATCGGGGTG
35941	AAACGATAAT	TCGGGATTGC	CCGGGCTTTC	ATGCCCCGCA	TACGATTAGC	CACACACCGC
36001	TGGTAAGGCT	GCCTGAGCAG	ATCTTCCGGG	CTGATGGGTT	CATGTATATA	TCCGGCCGGA
36061	AACTCTTTAC	CATCCAGGTT	CAGGTTATGA	DGTAAGTTAT	ATAGACAGTG	CACCAACATT
36121	TGCCACGTT	TGAGATATTC	CGTATCAACA	GGTTTGACAA	ATAAATCAGA	CGGTGCGGCA
36181	GAGACGGATG	TATCATATGT	CACAGGCAGA	AGTGGCAGCT	TGCTGACAGT	AAGCATTAAC
36241	TCCTGTGCC	GTGCTTCACT	GTTCATACAC	AGAGCCACAT	CTTGACAGGT	ACGGGGTTGC
36301	CAGTTTGCCG	CGAGCAGAAAT	ATCAGGCTG	GTACCCAGTA	ACATATTGAC	GGAGTCATAG
36361	ATCTGCTTGG	CGACAGTACG	TGCAGTGGAT	GTACAGTTAC	GGTATTCCAT	GTCTCCCTGA
36421	TCTAACAGAT	TCTTGACATA	GAAACGGAAT	ATTGCTTTCC	GGTAGTGAAT	GGGTTCACTG
36481	GCTGCAATGG	CACTCCGATC	GGTTGGTTCA	ATTAACATCC	GGTACATGGT	GGGTGGAGGA
36541	TCATAAATTG	GCGGTGAATT	CCAGTAACGC	GGTTTACCTT	GGTTGCTGGC	CTGAACAGT
36601	TCATCTTTCA	GCGGATTAAT	AATATAGTGC	AGCCATTCGG	TGGCCTCTTT	TAATCGTTGT
36661	TCTATATTGA	GTGCGCACGC	GACACAGAAAT	GGCATATGGA	AAAACAGTTC	CCGAAATAG
36721	ATCCCAATTC	CGCCATTTAA	ATCAATCGGC	GTAGGGAATG	AAACCGGAT	AGGCTGTTCC
36781	GTAAATAGCT	GTGTATTCCA	GCTCAGTACC	TGCGGGATAC	CCTGACTGGC	AATGGCQATC
36841	AGTTTTTTTT	CAACAGTGT	ATTAAGGCGA	ATGTTTTTGT	GCGGGTTATC	AGTTTCACTT
36901	GCGGGGAGG	AAAGGAATTG	CACCTGATCC	TGTTCAATGA	GTTTAATCAG	TTGCGGAATA
36961	TGCATACCGA	TTCTGAACTC	TTGAGTACAG	CTGGCACTTT	CATGGCCAAC	ACCACTTTTG
37021	GGCTTAAGAG	GAAGTTGGGC	TTTCAGGGTG	ATTCCATTAT	CCGACCCACG	CTTGATGAT
37081	GGATAGGTTA	AATCAAGAAC	TTTTTCGCTC	AGTACCAGTG	GTGTTTCATC	CAAGACAGTA
37141	TTATCGTGCA	TCAGCCCGAA	AGAACCGTTG	TAATATTGAT	GATCTTCTAT	CGCACCAAAC
37201	TTAAAGTCAG	ATTGAGCGAC	AATCTCCAGT	GTGTCAATCG	TGCCATGAAC	AAAATTGACA
37261	ATCAGTTTGA	TACTGTCTTT	GCGGAATCA	GGTTTCATTC	CGGTTTCGAT	TCTCCGGCAA
37321	TAGGAAGGCG	TTCTTCCCGG	GTTGCCGGAT	AGAGCAACAT	AGTACGGTAA	TCCATAGGAT
37381	TGCCTTAAGG	CATCCTTTTG	TTCACTGAGG	TAATACCGAG	CCAGGTTGCC	GACATATTTT
37441	CCTTTTCTTC	CATCAGCATA	TTGGTTCATC	GGCAAAATCAG	TAATTTCTAC	CAGCAGTGTA
37501	TGCGAGACAT	AAACGGAAGC	TTGGTCAATA	TCATAATCCT	TACCTTTCTT	ATCTGTCCCC
37561	TGAAGACGGA	CAACCGGAAC	CAGAGCCAGA	AACGGGTTAT	GCGGGTCTTG	CTGTATATCC
37621	ATCACAGCAA	CCATCTGGGC	CATCCGGTAT	TGCAGATGTC	TTGCGCGAGA	ATGGTGGGTG
37681	TACTCCAGCT	GCCATCATAT	TTGGCATAAG	CGATTTTGAT	CCGSTCAGGA	ACGGTGTGGG
37741	AGGAACCCAA	TCACCCGAC	TAGGCTCAAC	GTTTTGGTTA	TGCAGTGATA	ACGCAGTGT
37801	ATCTTTAGTT	TCAGACTGTT	CTTCAACTTC	CGTCCAGGCA	ATATACAGGC	GATTAATTCAG
37861	GAAATGCGCG	CGTATCAAT	TGGGCTTAC	GCTGCCCAAT	GGCAGGTCAA	TGCTTTCCA
37921	CTCGCTCCAG	GCAATGGGAG	ATAACGCATC	GGTATCAGGA	TGGCGTATCG	AAAGATTCCAG
37981	TGAACGCCAG	TAATATTGGT	ATCGCTGCTT	ACGGGTACGT	CCGACAAAGA	AGAACTTATC
38041	GCGTTTGATG	TAAACACCAT	CTTCATAACC	TGCGATAACT	TTCAGGTTAC	TGACATCTTC

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Fig.2.

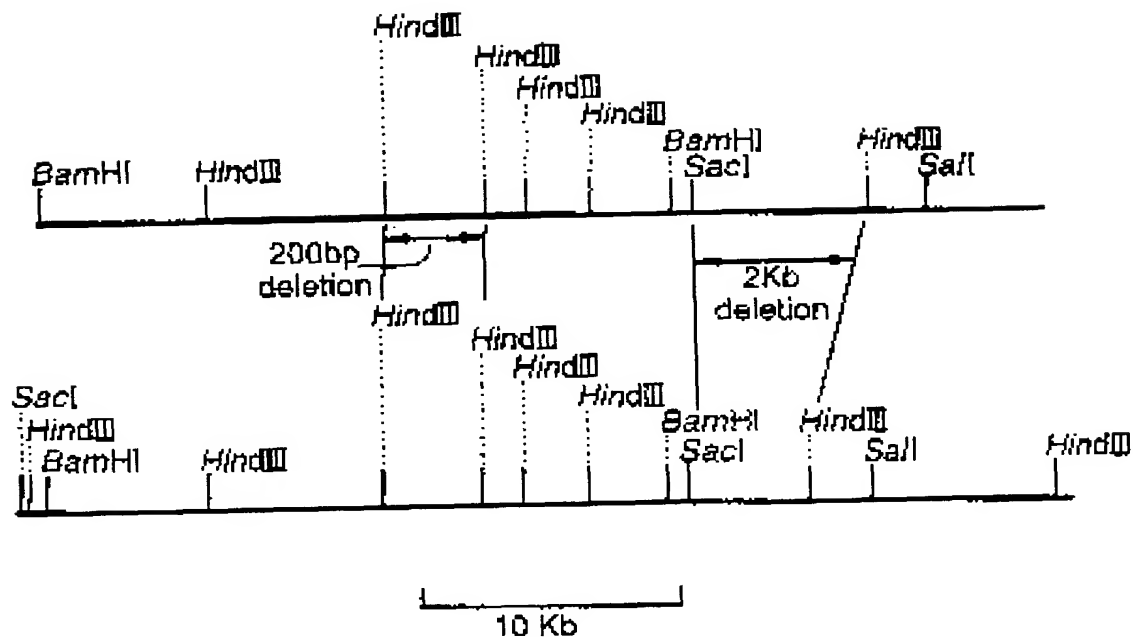
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38101 AAAATTATTG AGATACCGA GCACCGCTTG TTGTACAGAA TCTTCGGTAA TTTTCCCTG
38161 ATTAAGGSCA CTTTCAGTT GGAAGAAGAA TTCTGTTTA TTCAGGCGTA ACAGGGGTTG
38221 CAGATAGCTT TCCGGATAAG TCCGTAATAA GCGATCCC

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N=unspecified base

Fig.3.



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